

FLIGHT

and
AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

Cutting Out at Kure

THE old naval expression "cutting out" recalls many heroic incidents from the time of Drake, and even before. It implied the methods with which the British (or English) Navy used to deal with a hostile fleet which took refuge in a home port, trusting for protection to the batteries of guns on shore. Perhaps the most famous instance was when Drake "singed the King of Spain's beard" in 1587 by sailing into Cadiz harbour and destroying 10,000 tons of shipping, and thus postponing the sailing of the Armada. The latest example, where purely naval methods were used, was the cutting out of the prison ship *Altmark* in a Norwegian fiord by H.M.S. *Cossack*.

Air power has altered the methods of dealing with an enemy fleet which declines combat. With memories of Admiral Togo's victory at Tsushima to inspire the Admirals and seamen, everybody expected that the Japanese fleet would fight hard to defend the mighty tract which their countrymen had annexed after Pearl Harbour. But the Japanese Admirals have declined to close with the Americans. After being defeated at long range in the Coral Sea and at Midway, the yellow fleet has sedulously avoided coming to close quarters. The Americans expected to find it at Truk; but it was not there. Now it seems to have taken refuge at Kure in the Inland Sea which separates the Japanese islands from one another. There, if anywhere, it ought to be safe from attempts at cutting out by historic naval methods.

But Kure is not safe from air attack. There is no need for the Allied warships to risk loss from mines and shore batteries by going in after the coy enemy. Their carriers have taken aircraft to within easy striking distance, and what is left of the enemy fleet has been brought under the fire of bombs, rockets and perhaps

torpedoes. There seems no further chance of the aggressor attempting to defend his booty by sea power. What air power remains to him is being husbanded, so he says, for the last battle.

This cruise of the American and British fleets along the coasts of Japan is a remarkable performance. Presumably mines have had to be dealt with somehow. Undoubtedly lessons must have been learnt about the use of ship-borne aircraft in novel circumstances; and we must all be glad that British warships have been there to take part in a great feat and to learn what can be taught by experience.

Okinawa Pays Its Way

A NEW chapter in the air attack on Japan was opened on July 23rd when Superfortresses dropped 4,000 lb. bombs in the area which stretches from Nagoya to Osaka on the main Japanese island of Honshu. The raid was made by the largest force of B29 bombers ever despatched against the Japanese homeland; the Japanese accounts say that the number amounted to 700.

The Superfortress was designed with the object of being able to fly for long distances, and fuel capacity was considered of more account than bomb load. From its bases at Saipan and Guam in the Marianas group of islands the bombers were some 1,500 miles from Tokyo. For a considerable time this long flight was the only way in which the Allies could hit the Japanese homeland, and the ability to hit it was of more importance than the weight of each blow.

Lately the position has been radically changed by two developments, the ability of the American and British fleets to steam in close to the coast and strike with aircraft from their carriers, and by the capture of Okinawa in the Ryuku Islands lying to the north of Formosa.

The fighting for Okinawa was the most desperate and bloody struggle in which American land forces have had to engage in the Pacific, and we can now realise why the enemy resisted there with such desperation.

Okinawa is only some 500 to 600 miles from the heart of Japan, and now bombers starting from that point can dispense with nearly half of the fuel load hitherto found necessary and can proportionately increase the load of bombs. Presumably each Superfortress could carry one 4,000 lb. bomb from Okinawa to Japan, though it does not follow that every one of the 700 (or whatever the figure was) actually did so. The raid is said to have dumped nearly 4,000 tons of bombs in all on the Osaka-Nagoya peninsula. On that peninsula there are (or were) many factories turning out aircraft and other war-like stores; and we know by experience in Europe that heavy bombs give the best results in putting factories out of action.

Quicker Results?

IN his farewell message as Prime Minister to the British people our great war leader, Mr. Churchill, said that in the war against Japan "results may come much quicker than we have hitherto been entitled to expect." He was still Prime Minister when the ultimatum to Japan was despatched by the United States, Britain, and China, and he may well have had some knowledge of the peace-feeler which Tokyo sent to the United States on July 25th.

The Allied ultimatum spoke of the "prodigious" land, sea, and air forces poised to strike the final blow, and

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went on to emphasise that these forces had been "many times reinforced by their armies and air fleets from the west." The phrasing of this last sentence is notable, in that it omits mention of the navies but places air fleets on the same level as armies. As we have already pointed out, air power has played a more prominent part against Japan than in any other campaign, and the people of Nippon must be trembling at the thoughts of the additional air forces which are now being built up against them. Air power has apparently already destroyed their ability to fight at sea or in the air. Surrender is the only sensible action open to them.



A DARK LADY: The latest photograph of the Lockheed "Black Widow" night fighter which is in quantity production in California. It is the heaviest fighter in use, weighing over 25,000 lb.

Nationalisation

THIS journal is non-political and is thus not directly concerned with the change of Government. But politics enter very largely into aviation in many ways, far too much so in commercial aviation, and consequently we cannot be indifferent to the fact that the Labour Party has come into power with a majority sufficient to give the new Government the authority to institute sweeping reforms if it so wishes.

We are not unduly pessimistic about the future of the Royal Air Force. The lesson of what happened after the first World War will not have been forgotten, and no Government of 1945, whatever its colour, is likely to commit the folly of "axing" that Service, particularly after what it has achieved in this war, in the way that was done after 1918. Moreover, we remember that when the Labour Government was last in power, with the late Lord Thomson as Air Minister, it did pretty well by the R.A.F., at least as well as had previous Conservative Governments.

On the civil side, however, we are not quite so easy in our mind. The declared policy of Labour is nationalisation and, what is even more disturbing, internationalisation of air transport. It was assumed, when the White Paper was published some months ago, that it had been so drafted as to satisfy the Labour Party. But the views of a Labour Government may be somewhat different from those of a Labour Opposition, and it is to be expected that the White Paper may be considerably modified, if not actually scrapped, before British aviation policy is finalised.

WAR in the AIR

Superfortresses Drop 4,000 lb. Bombs : Japanese Peace Feeler : Ultimatum from Allies



"ILLUSTRIOUS LANDING": Lt. P. S. Cole, D.S.C., R.N., crash-lands his Corsair on returning from an airfield-strafting raid over Formosa.

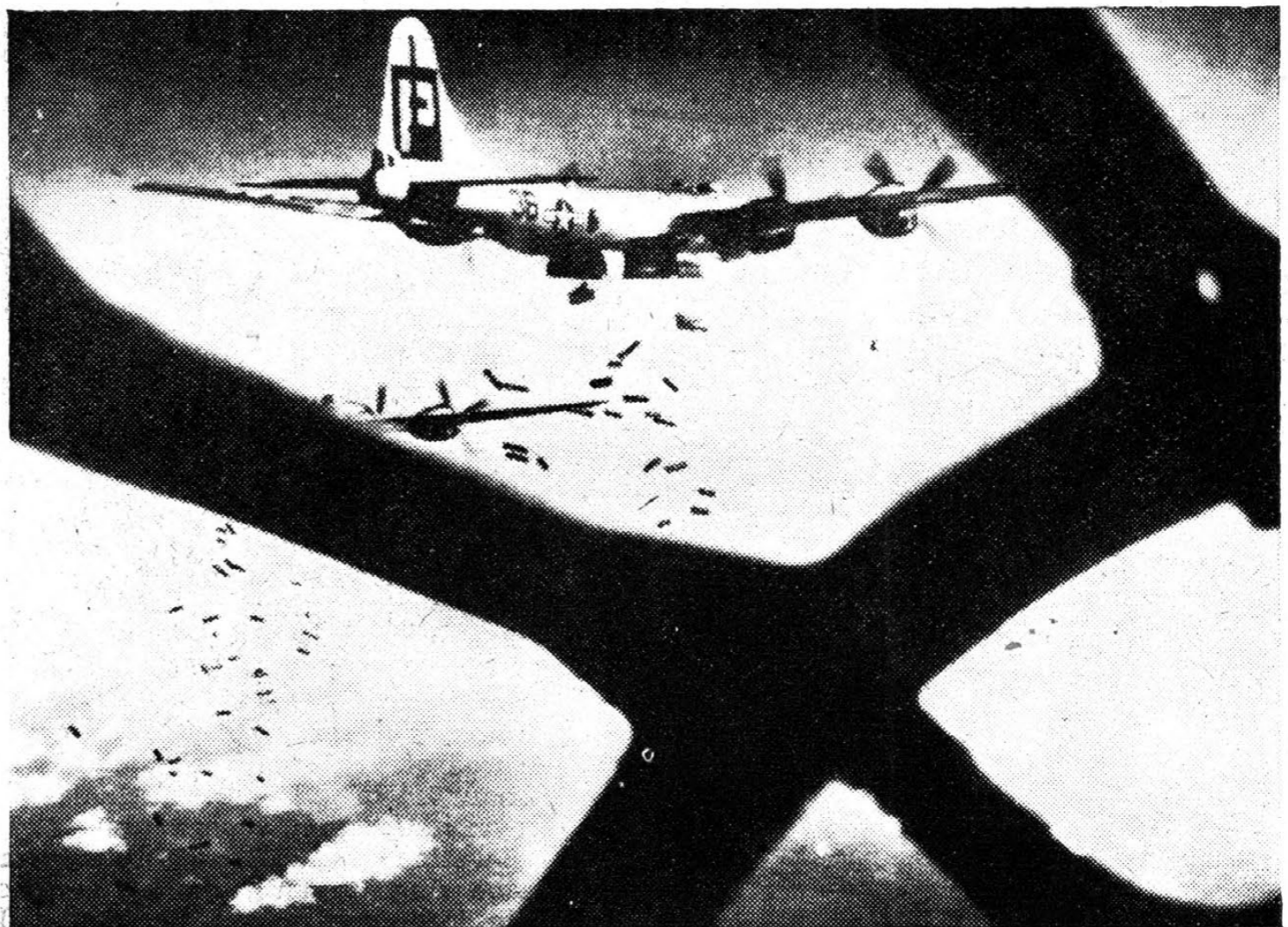
SINCE Alamein all Allied successes have been won by using the three Services as parts of one whole, none of which could have made a success of a campaign without the other two. The air has played an ever-increasing part in the operations; but nowhere has it been so prominent as in the war against Japan.

Land-based aircraft and carrier-borne machines have alternately been to the fore. The term sea power includes a proportion of air power, and it was American sea power which gradually drove the Japanese back from the neighbourhood of Australia to the shores of their own homeland. A terrific land struggle put the airfields of Okinawa at the disposal of land-based Superfortresses, which now can dispense with much of the load of fuel which they used to have to carry when they operated from Guam, and can use their lifting capacity to take bombs of 4,000 lb. weight to the industrial cities on Honshu. That is a most important development.

At the same time the 3rd Fleet, in which ships of the Royal Navy work under the command of the American, Admiral Halsey, have been able to cruise at their pleasure along the

coasts of the Japanese islands, while their big guns have showered shells on the Japanese cities and positions, and the aircraft have flown freely over the enemy country to deal with targets beyond the range of the guns. The British commander, Vice-Admiral Sir Henry Rawlings, has with him battle-ships and carriers of the most modern design. As is natural, the majority of

the warships and aircraft are American. It was always known that that would be so, just as the last stages of the war against Germany were fought by a combined force in which the majority was American. But the British contribution in the Pacific is formidable, and many of the ships have already been in tough actions. The carrier squadron in the British



HOTTING THINGS UP: Loads of 70-lb. petrol gel incendiary bombs cascading on to a Japanese city from U.S. Superfortresses.

WAR IN THE AIR

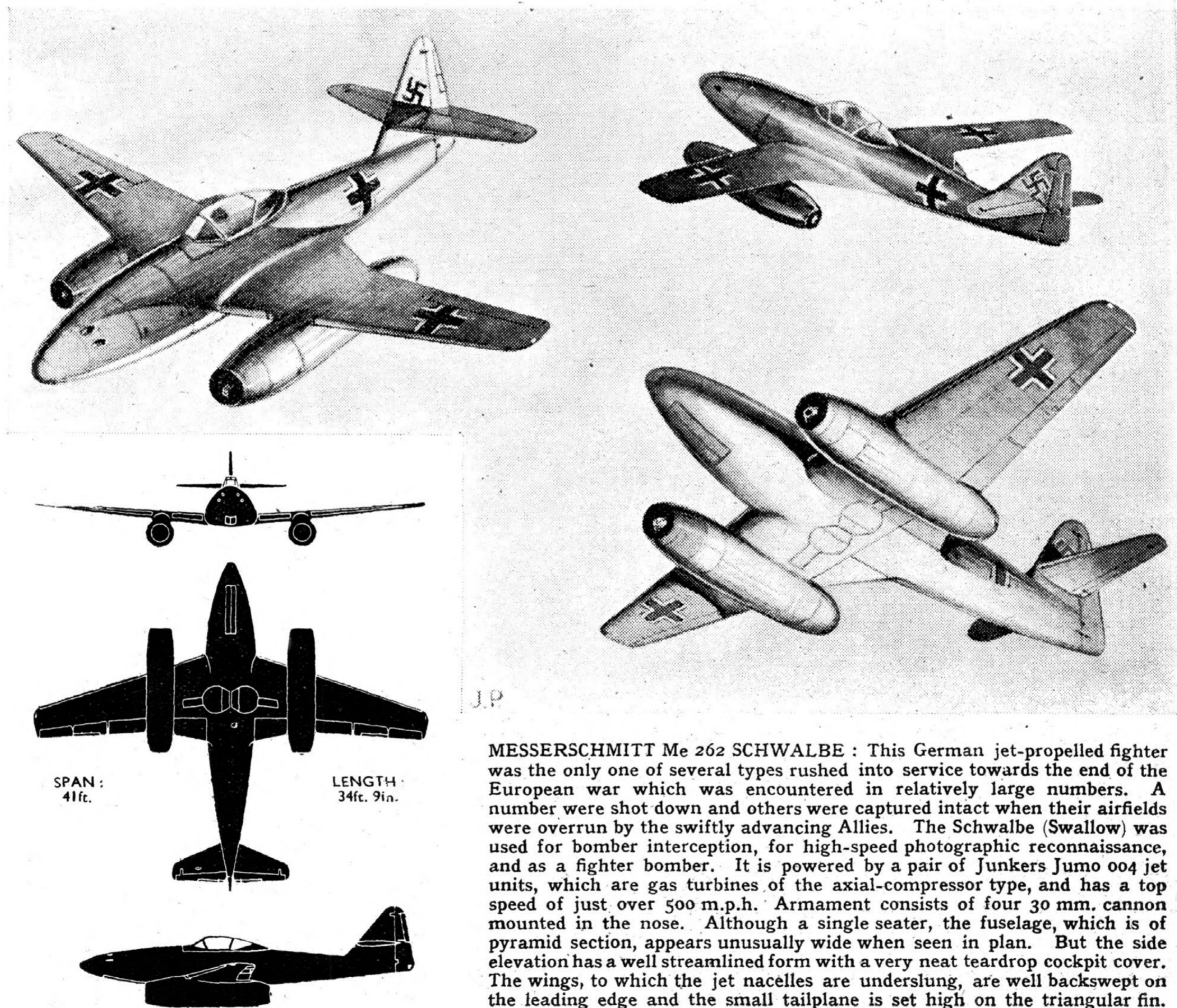
fleet is commanded by Vice-Admiral Sir Philip Vian, a tough fighting sailor who has been in many an action since the now distant days when he commanded the destroyer H.M.S. *Cossack* and liberated the British and Indian seamen who were prisoners in the German ship *Altmark*. In the recent operations he has been attacking the remnants of the Japanese Navy; but he has not had to run his ships up into dangerous fiords and to board the enemy. His carriers lie off shore at a distance which in other wars would seem risky enough, but now appear to be safe, and their aircraft fly across to the enemy naval base at Kure to strike at the enemy warships with every weapon at the disposal of sea-borne air power. They strike, too, at enemy airfields. The Japanese have been doing little enough in the air of late, but some time or other they will surely have to appear in the air once more. Before the attack on Kure, Admiral Halsey signalled, "Under the

punishment of this foray the enemy will probably strike back. Let us go in." It seemed a reasonable calculation, but only Japanese reconnaissance aircraft appeared, and they were speedily shot down or chased off by the fleet fighters.

Mr. Churchill's last act as Prime Minister of the United Kingdom, and therefore one of "the big Three," was to join with the United States and China in sending a summons to Japan to surrender unconditionally, and thereby to avert the wrath to come. Almost simultaneously Tokyo radio sent an appeal to the United States to be merciful. Japan has not deserved kind treatment, and many people will feel that it would be a good thing for the future of Asia that Japanese armies should be driven out of Malaya and Hong Kong by the arms of Britain and India, and out of China by the combined forces of China and the United States. Prestige always counts for more in Asia than elsewhere, and we should like the people of Malaya and China to see the boastful and cruel Japanese driven

out by the military power of the Allies. But it would certainly have a salutary effect if those peoples saw the once insolent invaders laying down their arms and surrendering. In Japan even more than elsewhere the "saving of face" is an object counted more important than life or death, and unconditional surrender would impress the Japanese perhaps even more than the annihilation of their armies in some Armageddon. A Japanese surrender would also save many Allied lives.

The Japanese are careless of the lives of their own people, but they clearly do not like being bombed. General Arnold, who commands the U.S. Army Air Forces, has said that if the war lasts until next year the Allies will drop more than two million tons of bombs on Japan. This is more than three times the amount we dropped on Germany—and Germany is ten times the size of the Japanese homeland. It is also more thickly populated, and so the devastation will be more complete than in the case of Germany.



MESSERSCHMITT Me 262 SCHWALBE : This German jet-propelled fighter was the only one of several types rushed into service towards the end of the European war which was encountered in relatively large numbers. A number were shot down and others were captured intact when their airfields were overrun by the swiftly advancing Allies. The Schwalbe (Swallow) was used for bomber interception, for high-speed photographic reconnaissance, and as a fighter bomber. It is powered by a pair of Junkers Jumo 004 jet units, which are gas turbines of the axial-compressor type, and has a top speed of just over 500 m.p.h. Armament consists of four 30 mm. cannon mounted in the nose. Although a single seater, the fuselage, which is of pyramid section, appears unusually wide when seen in plan. But the side elevation has a well streamlined form with a very neat teardrop cockpit cover. The wings, to which the jet nacelles are underslung, are well backswept on the leading edge and the small tailplane is set high on the triangular fin.

HERE AND THERE

Air to Ground

SIX ambulances with radio equipment, a gift from the R.A.F., were last week handed over to Professor Bonnet, head of the French Red Cross, by Lady Diana Duff Cooper, wife of the British Ambassador in Paris.

Arabian Knights

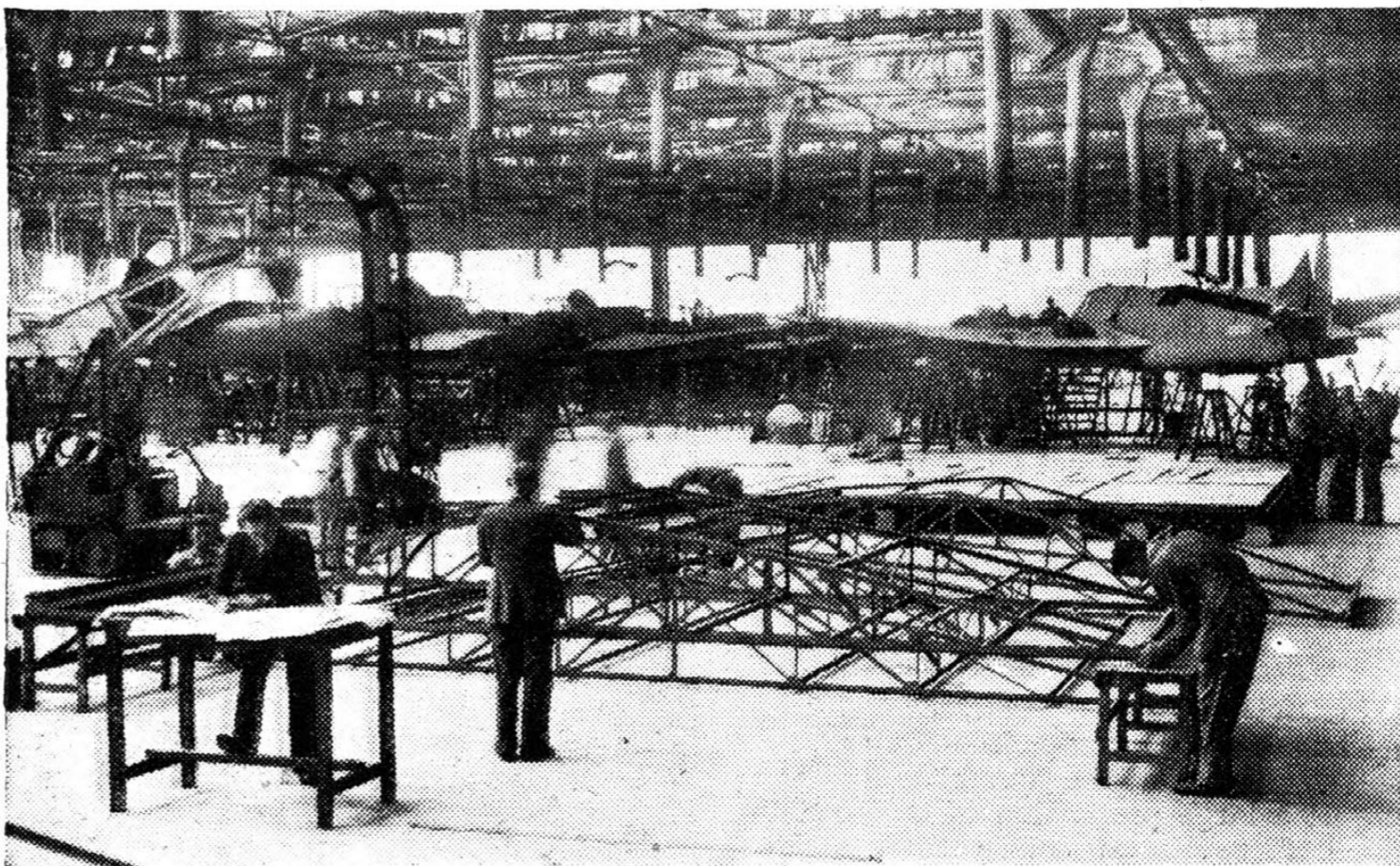
IT is reported from Damascus that the Syrian Government is to send fifty young Syrians abroad to be trained as pilots, and local newspapers suggest that the Egyptian flying school may be the one chosen with the idea of strengthening collaboration between the two Arab countries.

Hell Corner

MORE than 600 airmen who "ditched" between Dungeness and the Thames estuary during the war were saved by R.A.F. Air/Sea Rescue launches of Dover Command. These were violently attacked by *Luftwaffe* aircraft and, at the time of the Dieppe raid, suffered a 50 per cent. loss whenever they put to sea.

At Greenock—

MORE than 500 men — skilled mechanics and apprentices—were dismissed by Scottish Aviation, Ltd., Greenock, last Saturday, July 28th. The men alleged that recent contracts had been curtailed so that work could be diverted to England, otherwise the estab-



BEAUMAISON: In Bristol's factory at Weston-super-Mare it is hoped to turn out 1,200 A.I.R.O.H. prefabricated aluminium houses per month when production is in full swing. These houses, seen here during assembly in the erecting shop which formerly produced Beaufighters, are built in four complete units ready for transporting to the previously prepared site.

lishment could have been maintained until June, 1946.

—And at Belfast

THE week before, 500 workers were also dismissed from the Northern Ireland factory of Short and Harland, owing to lack of work.

On the previous day a big deputation from this plant went to Parliament House, Belfast, to protest against dismissals and had planned to stage a stay-in strike as a further protest, but they accepted their cards and left the factory. Hundreds more, it is reported, are to be paid off at succeeding week-ends.

The Missing Key

LIEUT.-GEN. SABURO ENDO, director of the Japanese Air Arms Board, is reported by their news agency as saying: "The key to complete annihilation of the enemy lies in definite concentra-

tion of all available national strength on aircraft production." Absolute priority, he said, must be given to the aircraft industry.

For Involuntary Campers

AMERICAN airmen flying in the Pacific will carry a new jungle kit containing, among other things, a five-inch frying pan. The new kit, now in production at an Air Technical Service Command factory in Britain, is approximately a foot square and 2½ in. thick and also contains hunting knives, fishing tackle, flares and medical supplies.

Jap "War of Nerves"

THE *Daily Express* last week published a statement from their own news service in New York to the effect that Willys Overland Motors are to produce 25,000,000 flying bombs of the V1 type at their Toledo (Ohio) plant.

Yes, that was the figure—twenty-five million!

Airborne Votes

LAST of the airborne ballot bags from troops in the Far East and on the Continent arrived on Tuesday, July 24th, at R.A.F. Transport Command airports in England.

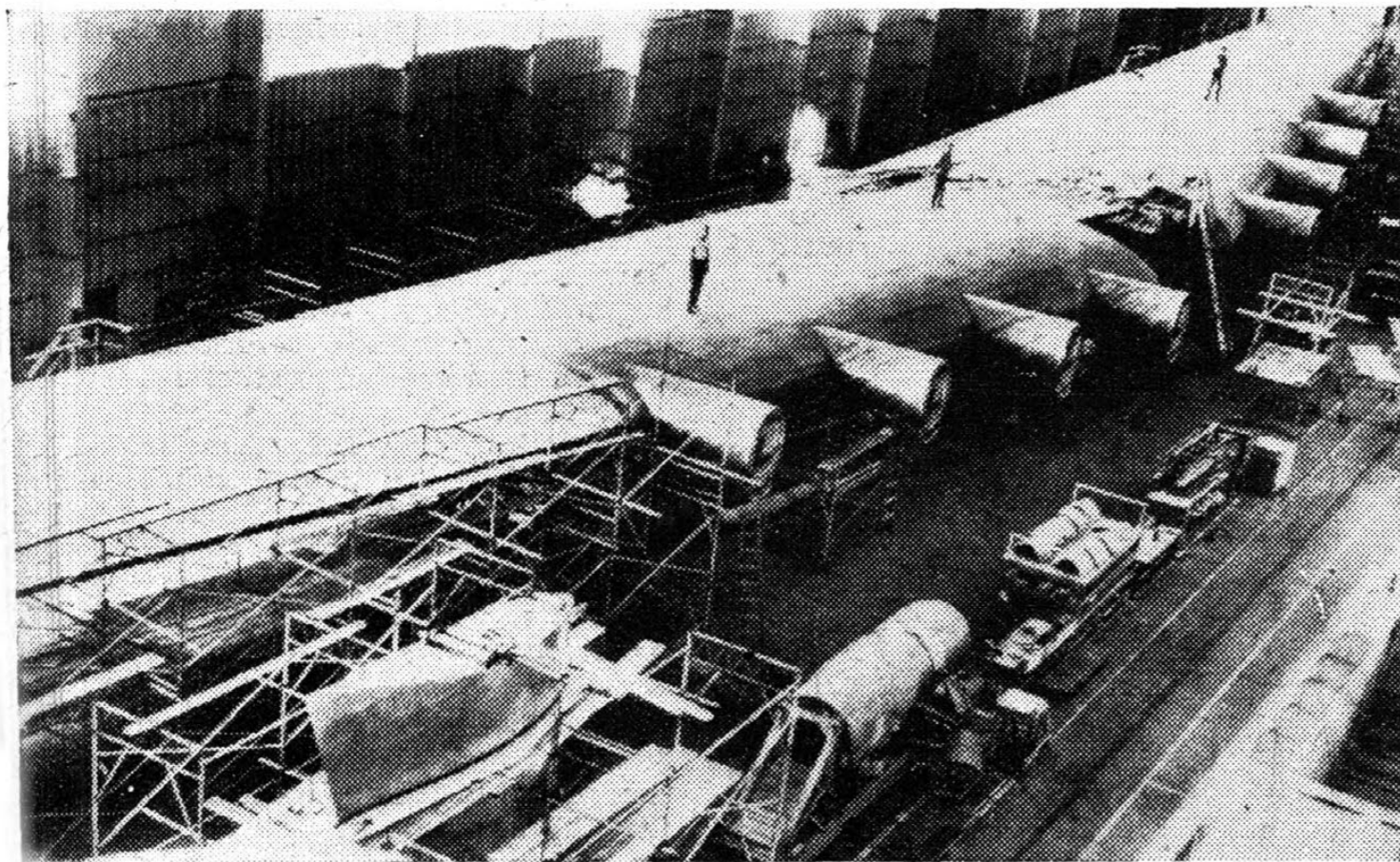
Sixteen bags reached Lyneham, Wiltshire, from Colombo (Ceylon) and Shaibah, on the Persian Gulf, and on the previous day 42 bags were handled from Colombo and the Middle East.

From units in the Berlin area 60 bags were received on the Tuesday, bringing the Berlin figure for the previous week to just over 400. In the same period 224 bags came from Brussels, 101 from Lubeck, and 18 from Hanover.

The Great Petrol Mystery

THE Government's marked reluctance to release anything like a really useful amount of petrol for general use—not to mention freeing it from rationing altogether!—is creating widespread dissatisfaction and even indignation.

This has been sharpened by the unconvincing excuses made whenever the authorities are tackled on the subject.



BIGGEST EVER: The world's biggest aircraft to date, the Hughes Hercules flying boat now being built at Culver City, California, has a span of 320ft. and its wings are 13ft. thick at the roots. Built of wood, it is powered by eight radial engines.

HERE AND THERE

Motorist readers of *Flight* find it more than difficult to accept any suggestion that there is still a shortage of fuel in view of Sir Archibald Sinclair's statement in the House on May 16th last.

The then Air Minister said that during the last year of the war in Europe, the R.A.F. used 1,250,000 gallons a day in their operations against Germany.

Only a very small fraction of this gigantic supply is being used by the R.A.F. and other Services in this country to-day.

Getting Their Own Back

ACCORDING to Professor Uytendogaart, a Dutch engineer living near the V2 sites on the outskirts of The Hague, a large proportion of the rockets launched never got more than a few hundreds yards into the air and fell in or near The Hague.

The professor described to British and American correspondents how he made scale drawings of the V2 and sent them to England soon after the Germans started firing them at London.

Returned to the R.A.F.

DUNKESWELL airfield, in Devonshire, which has been the main U.S. Naval Air Base in Britain since September, 1943, until they ceased operations there in June, was vacated by the Americans last Friday and handed over to R.A.F. Transport Command.

The U.S. airmen flew from there in support of surface craft engaged in anti-submarine activities in the Atlantic and the Bay of Biscay and were under the operational control of Coastal Command.

In our issue of June 21st we published a photograph of Air Chief Marshal Sir Sholto Douglas decorating some of the American pilots at the "closing down" ceremony.

To Aid U.S. Research

THE setting up by the U.S. Government of a National Research Foundation and the creation of a permanent Science Advisory Board are two important recommendations in the report submitted to President Truman by Dr. Vannevar Bush, director of the Office of Scientific Research and Development.

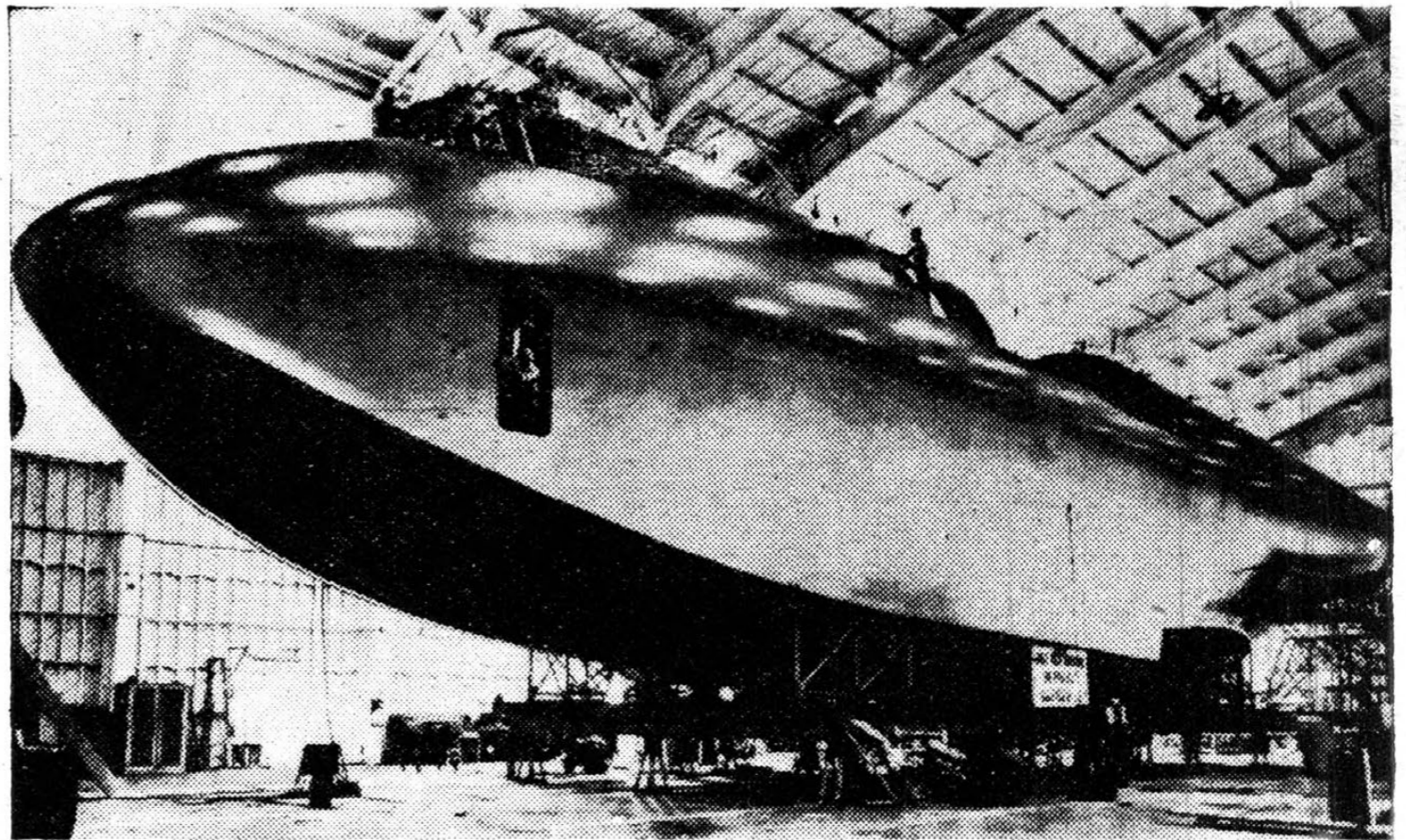
This report is in response to a request from the late President Roosevelt that Dr. Bush and his colleagues should suggest what could be done to harness the organisations of wartime science, and its discoveries, for the peacetime benefit of humanity.

Federal Support

THE report is a comprehensive one (it fills six pages of foolscap), and its recommendations include a programme for Federal support of research at existing colleges, universities, and research institutes, and for the financing of applied research in the public interest at a cost estimated to reach about \$50,000 annually when fully under way.

No special mention is made of aviation, but it would obviously come within the scope of these far-reaching proposals.

On July 19th a Bill implementing Dr. Bush's recommendations was submitted to the Senate by Senator W. G. Magnuson, who described them as "vital to the future of the nation."



HERCULEAN HULL : And here is the hull of the Hercules nearing completion. It measures 220ft. in length, is 30ft. high and 25ft. wide.

News in Brief

YESTERDAY, August 1st, was proclaimed "Air Force Day" by President Truman, in recognition of the accomplishments of U.S. air power. This was officially announced at the White House last week.

More than 1,000,000 miles have been flown by a squadron of Anson I aircraft on daily patrols of the south-east coast of Australia in search of submarines.

Mr. Arthur Sulzberger, editor of the *New York Times*, recently flew back to America after a visit to Europe. His return flight was via the Shannon Airport, Eire.

The Germans are reported to have continued to manufacture, up to the last possible moment in Berlin, secret radar equipment which they claimed indicated the speed, size and weight of all aircraft as soon as they had taken off from Britain.

A sailplane flight from Paris to Aachen (Aix-la-Chapelle), claimed to be a new record, was achieved last week by a French pilot, M. Lépense; the distance is 230 miles. Mlle. Marcelle Choynet set up a new sailplane record for women by covering 156 miles; she landed south of Brussels.



"My nephew Oswald has a badge like that with his initial on."

After five years' service in the R.A. and the R.A.F., followed by nine months' convalescence after being invalided out of the latter Service, Sqn. Ldr. R. F. Turner has now resumed his duties as a director of Cooper and Turner, Ltd., Sheffield.

The Swedish Government is to hand over to the Russians all aircraft which at the time of the armistice were flown to Sweden from German territory. Stockholm radio, says Reuter, recently made this announcement, and added that a delegation from the Soviet Air Force was now studying some of these aircraft in Sweden.

In order to devote himself to the scientific development and application of aluminium alloys over a wider commercial field than hitherto, Mr. W. C. Devereux is relinquishing his position as chairman and managing director of High Duty Alloys, Ltd. He will, however, retain the chairmanship of International Alloys, Ltd.

Some Japanese shipbuilding yards are to be converted into plants for the manufacture of wooden aircraft, according to a recent Tokyo broadcast picked up in New York, and the work has already begun. Admiral Kantaro Suzuki has been touring aircraft factories as part of a drive to increase production.

Lord Brabazon of Tara has joined the Council of the Air Registration Board as a co-opted member of Group 4. The first three groups each comprise four members representing constructors, operators, and insurers of aircraft respectively.

Air Chief Marshal Sir Arthur Harris flew to Brazil last week, at the invitation of the Brazilian President, to attend the "Welcome Back" celebrations of the Brazilian Forces from Europe. Sir Arthur flew in a Lancaster escorted by two other "Lancs," and all three crews were men who had fought in the air war against Germany.



H.M.S. *Barham* lists to port after being hit by a salvo of torpedoes at close range.

Battleships as Anti-Aircraft Vessels : Near Misses and Direct Hits : Mechanised Air Warfare

By B. J. HURREN

DURING the past few days, a public recently deluged with election political clap-trap has had itself supplied in bulk with enough material to provide a score of prolegomena on which to base post-war textbooks on tactics and strategy.

As it is unlikely that all of this information, issued piecemeal by officialdom, has been assimilated and mentally correlated, it is daily becoming clear that the issue of the battleship "To Be or Not To Be" is looming sharply. But first—the facts.

On the news reels an awe-inspiring film has shown the last hours of the battleship H.M.S. *Barham*. The sinking is a horrific sight, and a most moving one to a race of seamen. The dramatic passing to eternity of this magnificent ship was all over in four minutes. A stately emblem of British sea power under way in an open sea in the Eastern Mediterranean, she disappeared completely, less than five minutes later, after a fantastic explosion. Four torpedoes from a lurking submarine put paid to her existence.

The significant thing about this film—for those who have eyes to see—is that there is palpably no air cover or even sea escort to this mighty ship. She went without protection and paid the penalty. The date was November, 1941.

A few weeks before the release of this information

accounts in diluted form were permitted concerning the strike by Italian midget submarines against the battleships *Queen Elizabeth* and *Valiant*, in Alexandria harbour. Both of these ships were heavily damaged and were rendered *hors de combat* for many months. They were struck, and crippled, three weeks after *Barham* was sunk.

In between these terrible blows at British sea power, two other ships of the first line had likewise paid the penalty of lack of air protection. They were the battleships *Prince of Wales* and *Repulse*, sunk by torpedoes from Jap aircraft in Malayan waters whilst sailing devoid of all air protection.

We can thus chalk on the board what everyone in the Navy and many in the R.A.F. have long known. Five British battleships were sunk or very heavily crippled in the space of only a month at the outside. And these dreadful events occurred after a year of almost unrelieved defeat when (as a famous English Admiral remarked many years ago) England needed a victory.

So far as any reasonable assessment can be made, it did not seem to affect the issue of the war one jot. It was, one might say, a sea Dunkirk—and the undoubted defeats made no more difference, superficially, than did that military defeat on land in France in 1940.

The next interesting revela-

IN this article our contributor states his belief that air power has altered the function of the battleship. He also stresses the fact that during no action in this war have the opposing navies and their air arms simultaneously come to grips. The theory of capsizing warships by under-water explosions from near misses by super heavy bombs (exclusively dealt with in Flight as long ago as November, 1944,) is further discussed. He is wrong in his statement that no bombs pierced the Tirpitz. Readers will remember that we recently published a photograph of the exit hole of a large piece of a 12,000 pounder.

ANALYSIS OF RESULTS

tion concerns the German battleship *Tirpitz*. This had been repeatedly attacked by sea and air. A handful of Fairey Albacores set the series in motion with a frail attack of negative result. One-man or midget submarines had their turn, and still *Tirpitz* kept afloat (as did *Q.E.* and *Valiant*, earlier). Then came the Barracudas in April, 1944. They scored many hits, but still *Tirpitz* was right side up. Then came a short sequence of attacks by heavies, until finally *Tirpitz* capsized after an attack by Lancasters using 12,000-lb. bombs. Many of these bombs fell extraordinarily wide of the target, only five actually being on the mark or near-miss efforts.

A sequence of absorbingly interesting photographs from official sources has just been published. These pictures show, quite unmistakably, a clean bottom to the capsized *Tirpitz*. Inscriptions direct attention to a large dent in the side of the ship, and clearly imply that it was this dent (or rather the cause of the dent, which was certainly clear of the ship) which brought about the capsizing.

One positive thing from the photographs as released is that the armour-piercing bombs did not go through the *Tirpitz* and blow a hole in her bottom as had been expected.

Now the sinking of *Tirpitz*, which has been most rightly attributed to R.A.F. action, has already been widely misinterpreted. In the first place, as with the British battleships already mentioned, *Tirpitz* had no air support or defence. It is fantastic, but it is true. It was criminally negligent of the Germans, with all their experience to show them the inevitable answer. The only possible conclusion and explanation to be drawn is that they *knew* bombs which hit the ship would not sink her, but that they

failed to grasp that near-misses could set up conditions which would cause her to capsize.

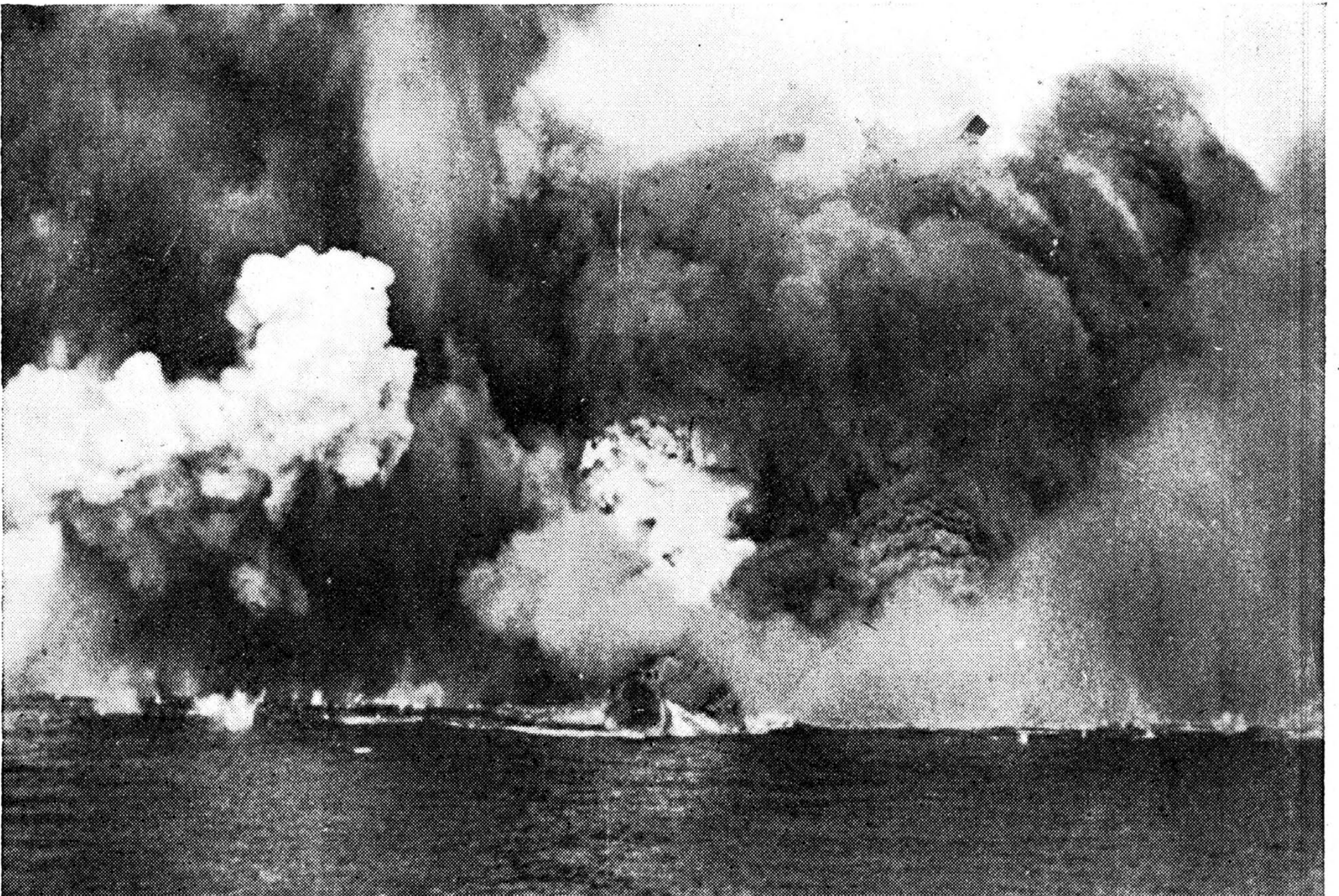
It will be seen, then, that reconstruction of the crime becomes as fascinating as a story of detective Whodunit. It is manifest that whilst the air fanatics argue that bigger bombs would penetrate the vitals of the ship or would cause her to turn over, the sea die-hards will argue that had the ship designers made provision for exceptional anti-capsize design—the R.A.F. success would not have been achieved. Both can argue that with (or, as the case may be, without) air protection the answer would have been different.

Now that the war has been won, these affairs may seem purely academic. The contrary is the fact. For the inevitable defeat of the Japanese will leave us with the question of bomber or battleship still undecided in combat. Despite the multitudinous actions already fought, there has never to date been an occasion where both combatants have engaged with sea and air power simultaneously. Taranto was won by naval air power—a handful of Swordfish crippled the Italian fleet.

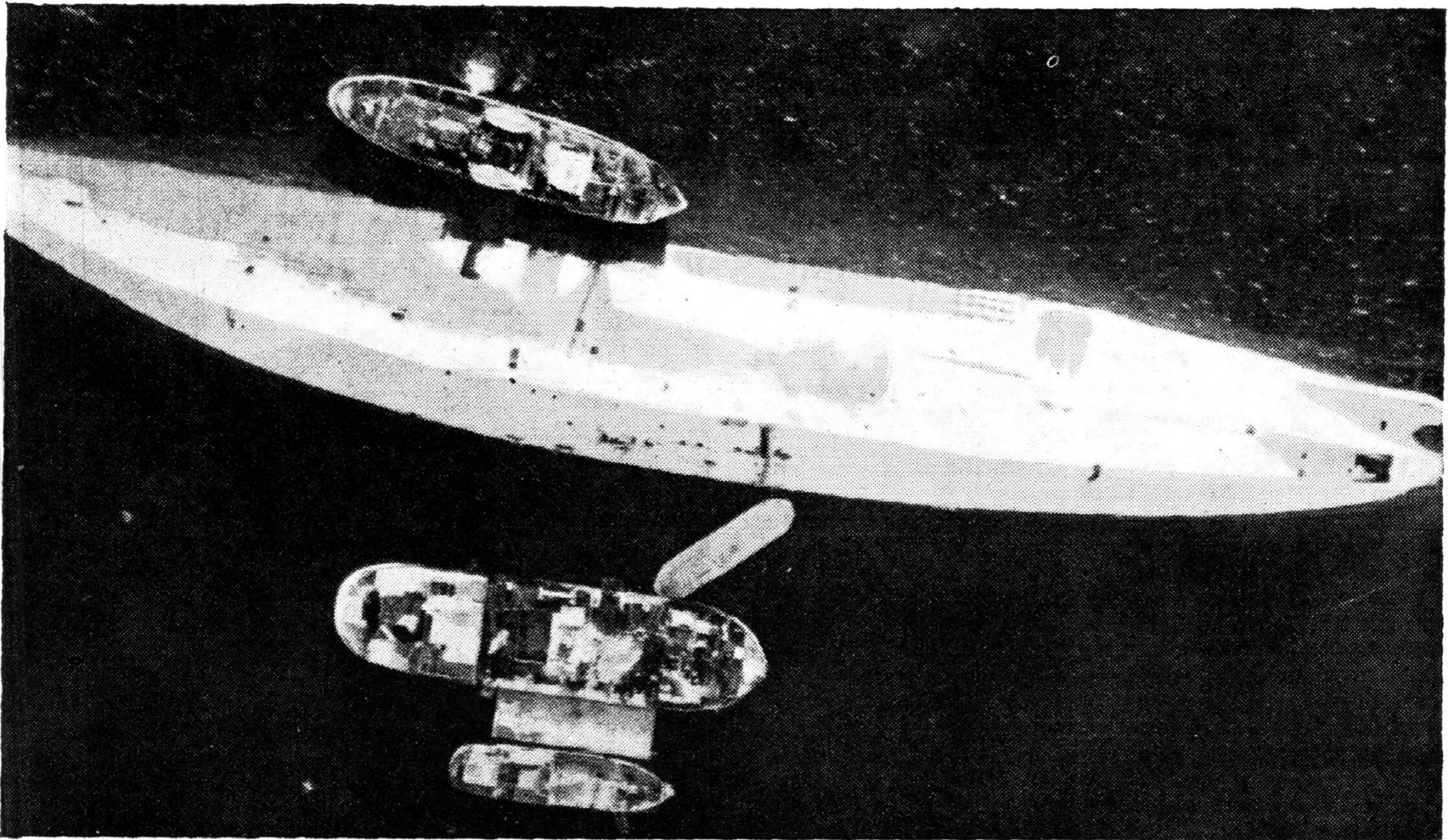
Paramount Decision

The Coral Sea, Midway, Leyte, *Graf Spee*, *Bismarck*, *Schärnhorst*, *Courageous*, *Glorious*, *Ark Royal*, and so on—not once has sea plus air power met in a final struggle. We may mention, in passing, the accidental sinking of the German cruiser *Leipzig*, capsized in harbour during an R.A.F. raid by massed bombers, whose near-miss bombs must have caused a tidal wave to overcome this light ship, just as mighty Atlantic waves have sunk merchant ships designed for normal rough seas.

The failure to decide this controversy of so long standing affects us all. It means that in the post-war budget for defence, the decision will have to be taken whether to build up and retain the present all-powerful air force;



THE PRICE OF NO AIR COVER: Four minutes after the *Barham* was hit her after-magazine blew up. She sank with the loss of 859 officers and men.



WRECK OF THE TIRPITZ : The capsized hull of the *Tirpitz* photographed four months after the vessel was turned over by 12,000 lb. bombs of the R.A.F.

or whether to expand it further, or whether to retain the obviously costly battleships, or whether to change the whole nature of battleships into purely defence warships to protect aircraft-carriers.

Leaving these momentous questions aside for a moment, for years there has been fostered the belief that land-based air power will always be superior to sea-borne air power. As long predicted in these columns, carrier-borne aircraft have in the last few days made raids of 1,000 aircraft on the very heart of Japan. Against the potential opposition of tens of thousands of desperate Jap airmen in nightmare aircraft—certainly far more formidable than ever set out from civilised bases—the so long maligned naval air power has triumphed indisputably.

Carriers or Airfields ?

It is no good avoiding facts. Anyone can prove on paper that the Hellcat is inferior to the best land-based fighters, and those same land fighters are demonstrably superior in attack in the air to oncoming bombers. Yet the answer in war is that the "inferior" aircraft coming from the sea have won the day, and possibly the entire Far East war.

This is equally important to the bomber versus battleship question. The point at issue is, in essence, this: Whether to maintain overseas a number of costly air bases and masses of land-based squadrons, or whether to maintain a numerically far inferior sea-going force which has the power to be rapidly concentrated, which is far cheaper to maintain than airfields throughout the world, and which also can demonstrably rely on lower category aircraft. In other words, overseas are we to maintain a sizeable carrier force or are we to establish and keep in being very many air bases?

This in turn raises even wider issues with which to supply headaches for the staff planners. When Jap sea power is broken, as inevitably it will be, the combined Anglo-American fleet dominates the seas. German, French, Italian, and all the other Powers collectively or severally cannot put to sea anything capable of engaging the massed English-speaking fleets, which muster great forces of warships, including at least 150 aircraft carriers.

If the land-based aircraft superiority theory holds good; if the prognostications of the rocket or what may be termed mechanised air warfare exponents are true, then we must decide soon on the major issue of land air power or sea power using ships plus aircraft.

Why must we decide soon? Because not even another Der Fuehrer or Il Duce or anybody else can possibly build a navy in quick time, whereas Germany demonstrated that in less than 10 years an air force can be built. There is every possible reason to believe that in less than five years you can build an attack force for mechanised air warfare (appropriately abbreviated to MAW!).

Every sane analyst of results in this European war, every person who underwent the ordeal of V.1 and V.2, appreciates keenly that the only real answer to these infamous attacks on civil populations is to strike at the launching sites. It requires no more than a moment's serious reflection to realise that the mobility of ships could create almost insoluble problems in the shape of attacks against launching sites: (1) because they could not be accurately located in time, and (2) because they could be so heavily defended at sea as to make attack almost prohibitive of failure.

There is one further aspect of the recent release of information. That is that the Germans right up to the last ditch were far from being beaten, and if one wanted to be unkind one might resurrect some of those superb essays in sheer idiocy issued by the Ministry of Economic Warfare. (We all know the one about Germany being starved of fats, of essential fuels, of ball bearings, and so on, not to mention the tanks made of cardboard rumour which swept the country.)

The British Government seems partial to White and other Papers. It has issued diatribes on anything from town planning to coal mining, from war statistics to civil aviation, from enemy atrocities to the Home Office report on drunks and crime. What is needed with all urgency is a report on the efficacy and employment of air power—at sea, on land, in the air—for with this everybody from aircraft constructor to taxpayer would be possibly led from the puzzle and paradoxes which analysis by results seem to give.

Meteor Undercarriage

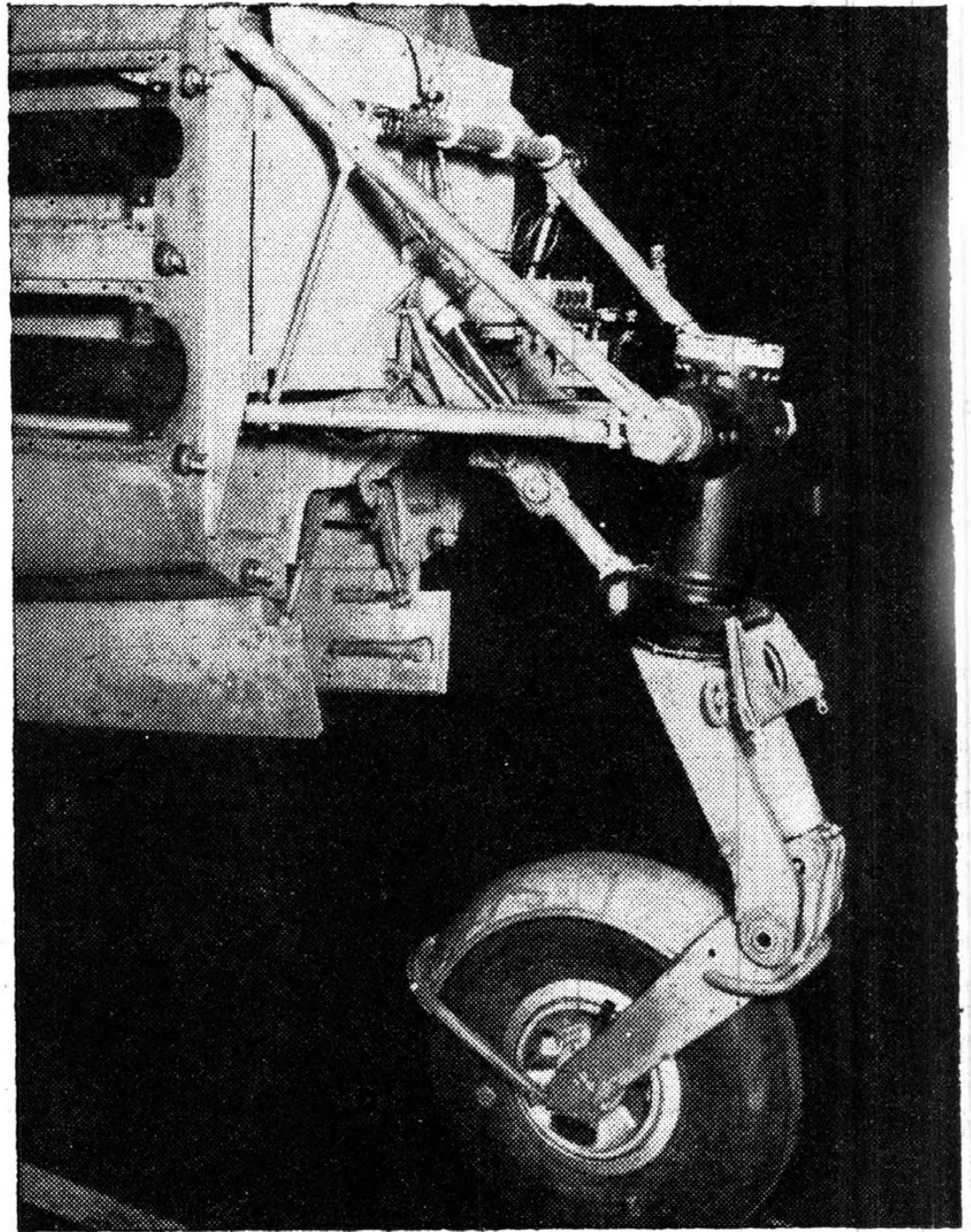
Details of the Dowty Undercarriage of the Gloster Jet-propelled Fighter

MENTION was made in our description of the Gloster Meteor jet fighter in the July 19th issue of the fact that the undercarriage presented special problems, due to the fact that the undercarriage legs had to be shortened during retraction. It is now possible to give further details of the manner in which the Dowty Levered Suspension undercarriage works.

Each main-wheel unit comprises a hollow member mounted to the aircraft and pivoted to a trailing wheel-fork at the lower end. A sliding block is accommodated within the bore of the main member. The shock absorber links the wheel-fork to the sliding block by means of pin joints, the complete structure forming a pivoted triangle. Combined drag and vertical loads create moments about the pivot points which are controlled by the shock absorber. The main fitting is purely a structural member as distinct from conventional type compression legs, thus relieving the shock absorber of bending and torsional forces, and is claimed to allow the fullest efficiency in all positions of operation. The units retract sideways and inboards, the movement being effected by the extension of a conventional hydraulic jack.

The shortening movement is produced by a sliding block moving up and down inside the main undercarriage member. A fixed arm which surrounds the pivot bar, and projects down between the top attachment lugs of the main member, is linked to the sliding block. This is clearly shown in one of the accompanying photographs.

The main member rotates about the pivot bar in the aircraft. The link rotates about the fixed arm and describes an arc which, during retraction, diminishes the distance between the sliding block and the pivot bar. The sliding block is thus drawn upwards, and the shock absorber forms a tie by which the main member and the wheel-fork are drawn together. On lowering the undercarriage, the sliding block and the wheel fork assume their normal position for operation. Considerable space is thus saved, a factor which will be greatly appreciated by

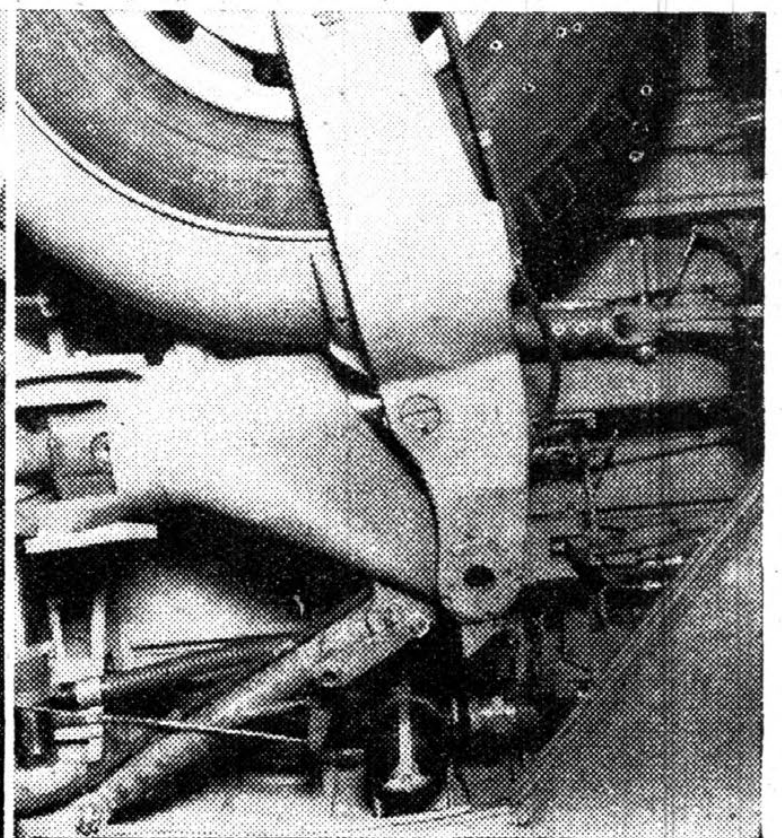
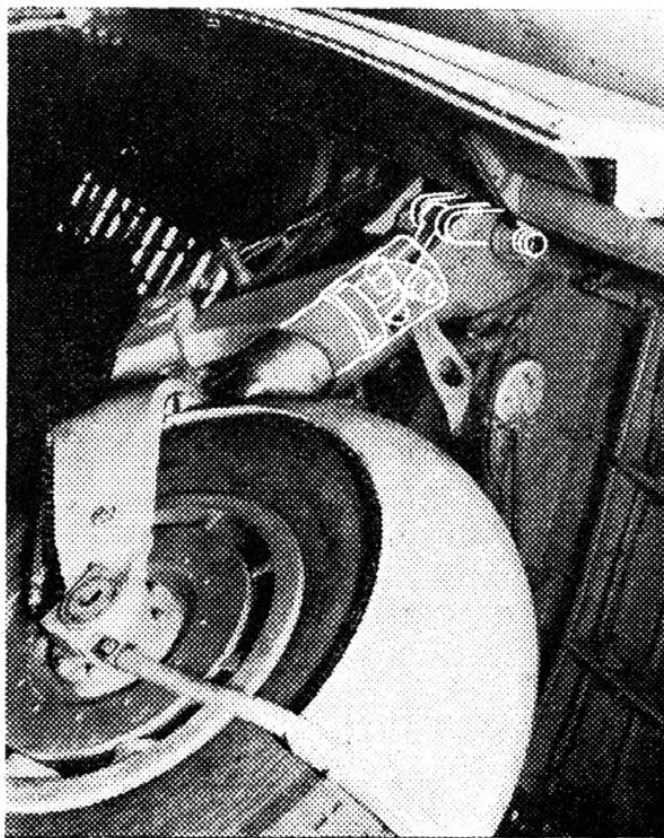
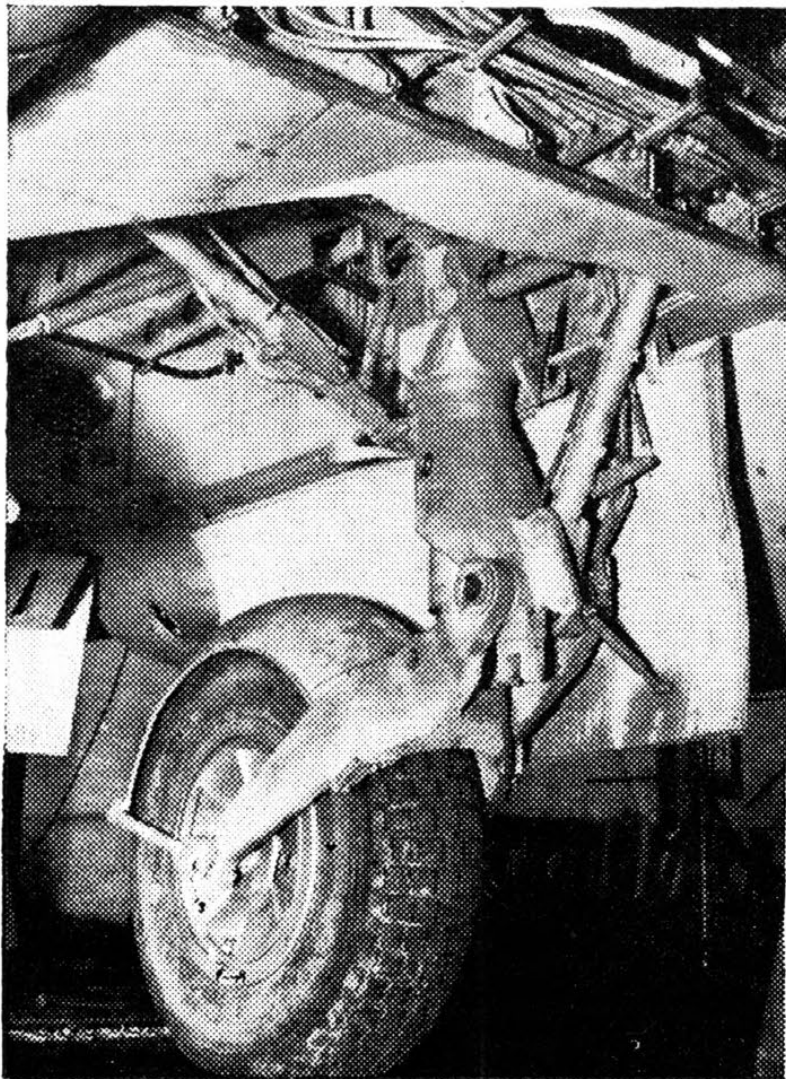


THE LEADING WHEEL: A stripped photograph of the Meteor's nose wheel showing the retraction mechanism and body attachment. The gun ports of the two starboard 20 mm. cannon can also be seen.

designers of laminar-flow, very thin aerofoil section wings.

The nosewheel is also Levered Suspension, an interesting feature being the shock absorber in tension. This arrangement provides a neat unit which occupies the minimum of space when retracted. Progressive hydraulic damping against shimmy is provided.

The aircraft auxiliary services are operated by a Dowty Live-Line Hydraulic system, supplied by a Live-Line pump mounted on an auxiliary gearbox driven by a flexible shaft from the propulsion unit.



THE STARBOARD WHEEL: (Left) A front view of the undercarriage under load. The fixed arm, surrounding the pivot bar and projecting downwards into the main member, can be clearly seen. (Centre) Rear view of the undercarriage leg during retraction. Note the position of the link and sliding block in relation to the fixed pivot points. (Right) An underneath view of the unit retracted. The main member and wheel fork are drawn together.

AIR CHIEF MARSHAL COURTNEY TO RETIRE

It is announced that Air Chief Marshal Sir Christopher L. Courtney, G.B.E., K.C.B., D.S.O., who has held the appointment of Member of the Air Council for Supply and Organisation through nearly six years of war, will relinquish the post in September next and shortly afterwards retire from the Royal Air Force.

He will be succeeded by Air Marshal Sir Leslie N. Hollinghurst, K.B.E., C.B., D.F.C., at present Air Officer Commanding, Base Air Forces, South-East Asia.

Air Chief Marshal Courtney has been Air Member for Supply and Organisation since January, 1940. Since then he has been responsible for the organisation of the Royal Air Force; for the provision of equipment, stores and food-stuffs; for the servicing and maintenance of technical equipment; for the building of airfields and works and buildings, and for transportation. He was previously a member of the mission to Canada in connection with the Joint Air Training Plan. In March, 1939, he was appointed Air Officer Commanding, Reserve Command, with the principal responsibility of building up the R.A.F. Volunteer Reserve.

Sir Christopher was commissioned in the Royal Navy in 1909, transferred to the Naval Wing of the Royal Flying Corps in 1913, and received the D.S.O. and C.B.E. for his services during the 1914-18 war.

After service in India and as an instructor at the R.A.F. Staff College, he was appointed Deputy Director of Operations and Intelligence at the Air Ministry in 1929. The following year he was posted to Iraq as Chief Staff Officer, and in 1932 was awarded the C.B. for his services in connection with the operations in Southern Kurdistan.

He became Director of Training at the Air Ministry in 1933, subsequently holding the posts of Director of Staff

Duties, Director of Operations and Intelligence, and Deputy Chief of the Air Staff. In 1937 he became Air Officer Commanding British Forces in Iraq, and in 1938 was appointed a member of Lord Chatfield's committee on the Defence of India. Sir Christopher was born in 1890 at Hampstead. He was made a K.C.B. in June, 1939, and a G.B.E. in January, 1945.

Air Marshal Sir Leslie Hollinghurst has been Air Officer Commanding, Base Air Forces, South-East Asia, since November, 1944. He was previously Air Officer Commanding No. 38 Group, and was responsible for the British airborne operations in the Normandy landings on D-Day. In 1943 he was Air Officer Commanding No. 9 Group, and for the previous three years was Director of Organisation, and later Director General of Organisation at the Air Ministry.

He enlisted as a lance-corporal in the Royal Engineers in 1914, and was commissioned in the R.F.C. in 1917, receiving the D.F.C. in 1918 for his service in France. After the war he served in India, and in 1924 took an R.A.F. Staff College course. Three years later he was engaged on air staff duties on the staff of the G.O.C., Shanghai Defence Force.

In 1932 he commanded No. 20 Squadron, India, remaining two years in that post, and returning, as an instructor, to the R.A.F. Staff College. Three years later, in 1938, he passed through the Imperial Defence College. He then went to the Department of the Air Member for Supply and Organisation as a deputy director.

Sir Leslie was born in January, 1895, at Hornsey, London, and was educated at Felsted. He received the O.B.E. in June, 1931, the C.B. in 1942, the C.B.E. in 1944, and was knighted in July, 1945.

FOUR-SEATER FOR 5,000 DOLLARS

Stinson Voyager to be Built by Consolidated Vultee

It has recently been announced that Consolidated Vultee Aircraft Corporation plans to build five Stinson models of private-owner type, ranging from a small two-seater to a twin-engined five-six seater.

The first of the range will be the Stinson Voyager, or type 125, the prototype of which has already been turned out at the Stinson division of Couvair, at Wayne, Michigan, where a second machine is nearing completion. The actual production machines will be manufactured at the Nashville division and at Wayne. It is expected that the first production model from the former plant will be flying in October next.

Officials of the company expect that the Voyager will be one of the first American private-owner types in its class to be made available to civilian purchasers. It will have a top speed of 128 m.p.h. and will cruise at 116 m.p.h.

With seating accommodation for four, the Voyager will have ultra-modern accessories and equipment, including finger-tip-control parking brakes and an electric self-starter, which will eliminate prop-swinging.

It is claimed that much of the experience gained in building the Stinson "Flying Jeep" L-5 for the U.S. Army Air Forces has been utilised in designing the Voyager. Complete data have not been released, but at the cruising speed

of 116 m.p.h. the still-air range is expected to be 580 miles. Estimated figures for take-off and climb are: take-off distance at sea level 550ft.; initial rate of climb 670 ft./min.; service ceiling 13,800ft. The landing run given is a short one of 280ft.

The price of the Voyager has not been finally settled, but it is expected to be in the region of 5,000 dollars. Not only this machine but the other four types contemplated will be marketed through the Stinson nation-wide distributor-dealer organisation.

The price quoted is certainly attractive, but it appears unlikely that the English equivalent of £1,000 will obtain over here.



The prototype of the Stinson Voyager 125. Production models are expected to be available from October onwards.

A-C Electrical Systems

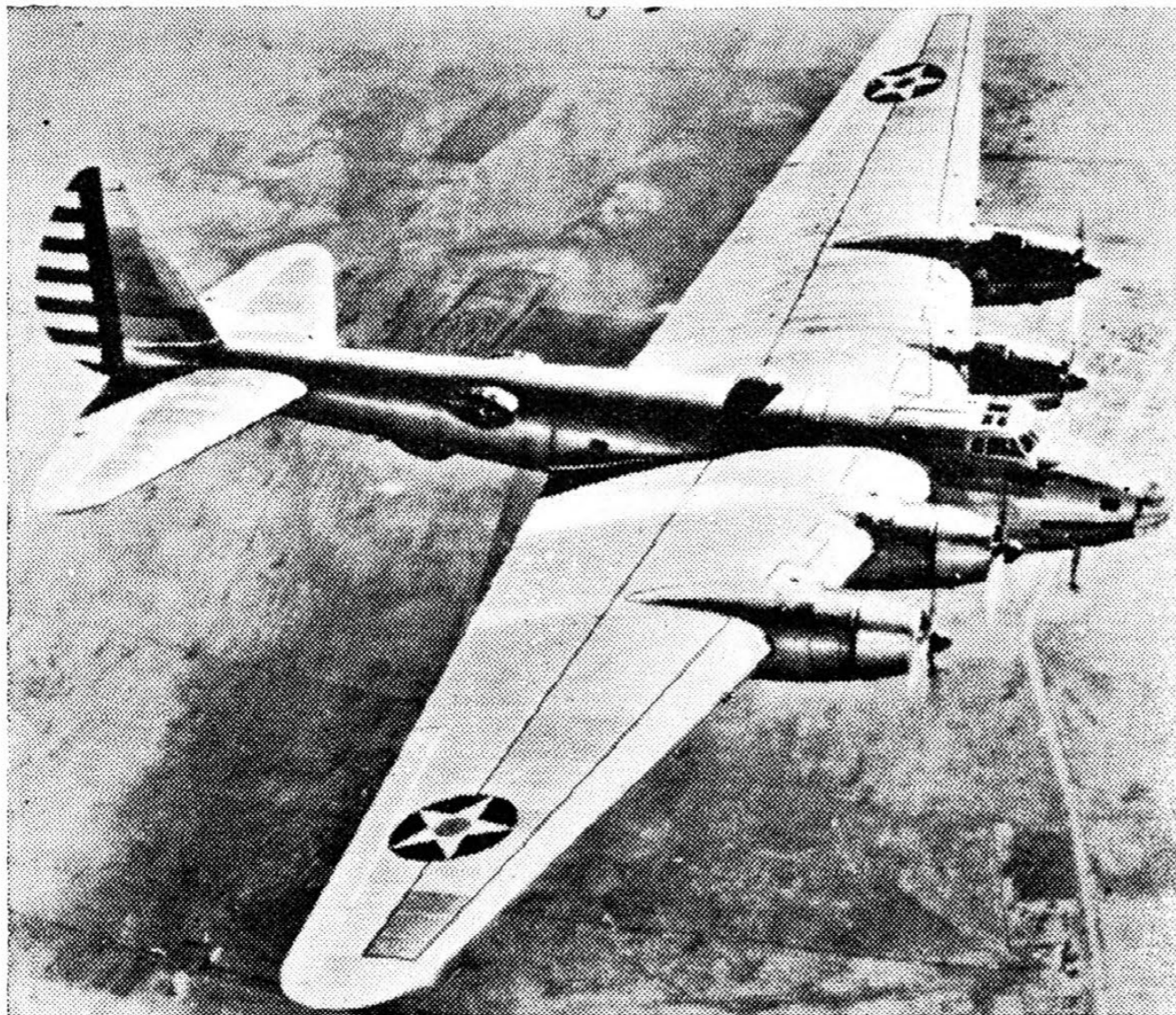
What the Development of High-voltage Systems Means to the Designer of Accessories

By J. D. MINER, Manager of Design Engineering Dept., Westinghouse Electric Corporation

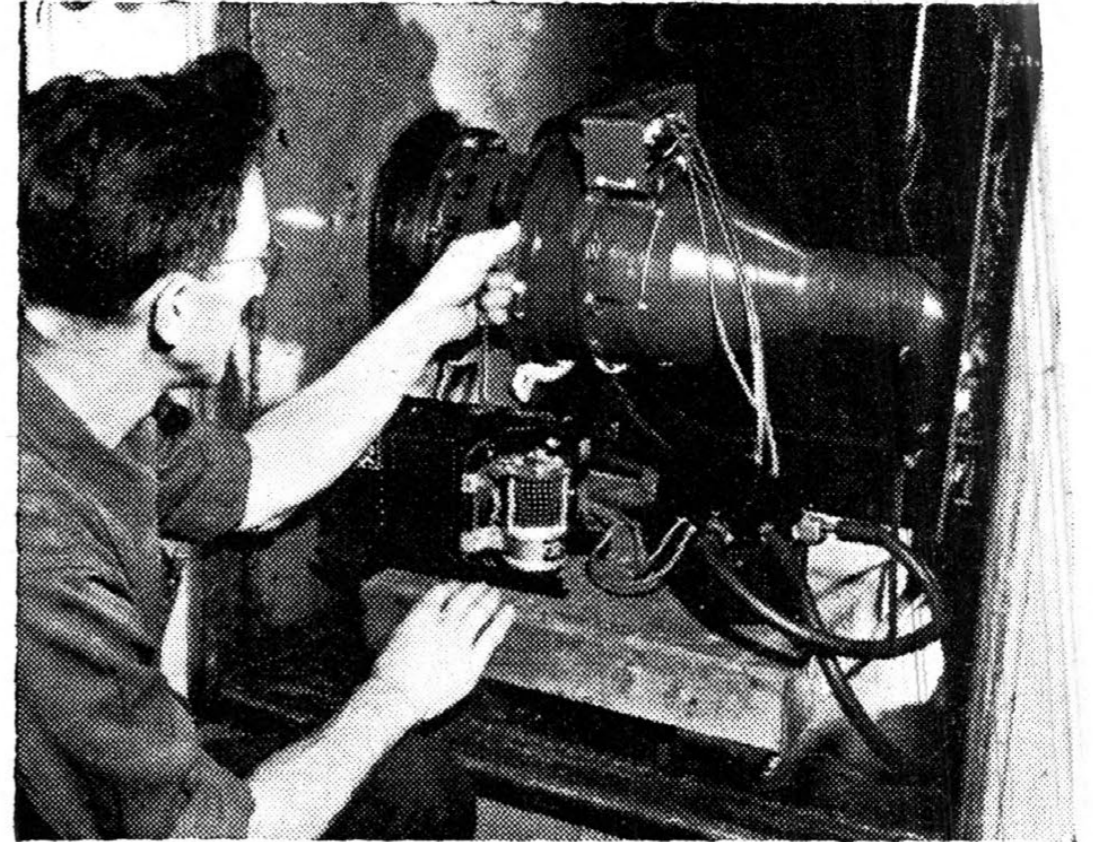
IT is slightly over two years since the U.S. Army Air Forces asked some of the leading electrical manufacturers of America to undertake the development of a wholly new alternating current electric system for aircraft. While some of the details are not ready for publication, enough can be revealed to make this an opportune time to review the progress which has been made, and to evaluate the significance of this very important development.

Fundamentally, the object of an A.C. system for aircraft is weight economy through the use of higher voltages than now appear practical for direct-current systems. Preliminary studies of A.C. electric systems started long before the war. U.S. Navy experience with high-power radio equipment had demonstrated as early as 1930 that A.C. power equipment was far more reliable than D.C. equipment for supplying high-plate voltages of the order of 1,000 to 2,000 volts. The use of dual generators providing variable-frequency alternating current for radio, and direct current for the power system, is common practice on naval aircraft, and is a compromise between D.C. and A.C. system which is adaptable to many aircraft of moderate size.

For very large machines a higher system voltage than the present 27-volt value is essential. Searching for ways to increase system voltage, the Army authorized two experimental aircraft equipped with A.C. systems in the middle 1930s. The XB-15 (Boeing's 1937 forerunner of the B-29) was equipped with a single-phase, 800-cycle system, and the XB-19 (Douglas' "Flying Laboratory") was equipped with a 120-volt, 400-cycle, three-phase system. System capacities were relatively small, the power supply for each aircraft being a pair of small auxiliary engine-driven alternators, and the installations were far short of the elaborate systems now being developed.



The Boeing XB-15 was the first aircraft in the world to carry a full 110-volt A.C. system.



A 40-kva alternator installed in a special chamber for altitude testing.

The XB-19 was test flown on June 27, 1941, some four years after test flights of the earlier XB-15. Operation of the electric equipment on the XB-19 demonstrated the superiority of polyphase power for motors and for parallel operation of alternators, as contrasted with previous experience with the single-phase system. Before December 7, 1941, alternating current-powered aircraft were interesting experiments, but with the advent of war they assumed new significance. Perfected A.C. systems, according to the more enthusiastic engineers at Wright Field, would mean that the electric system would no longer be a limiting consideration in determining the maximum size of an aircraft.

During the dark days of 1942, Japan rapidly acquired all of the air bases between Pearl Harbour and Australia. As the war developed, it began to appear high time to start developing an electric system which would overcome the limitations inherent in existing low-voltage systems; that is, by going to something of the order of the 230-volt industrial practice.

Direct Current v. Altitude

Long-range aircraft must necessarily be high-altitude machines; and it was quickly decided that high-voltage direct current at high altitudes was a gamble that could not be risked, partly because of the unknown hazards of low arcing voltages, and partly because of the known hazards of excessive brush wear at altitudes above 30,000ft. With this decision made, and a controversy initiated that is still raging, the Electrical Branch of the Equipment Laboratory at Wright Field set up an A.C. engineering unit and attacked in earnest the problem of an A.C. electric system.

Conferences with selected manufacturers began in December, 1942, and tentative specifications were gradually whipped into shape. Basic elements of the system have been fixed since a general meeting called at Wright Field

on January 18, 1943. System characteristics are as follows:—

| | |
|-----------------------------|---|
| Volts, line-to-line | 208 at generator |
| Volts, line-to-neutral | 200 at load centres 120 at generator |
| Frequency | 400±20 cycles per second |
| Neutral | grounded |

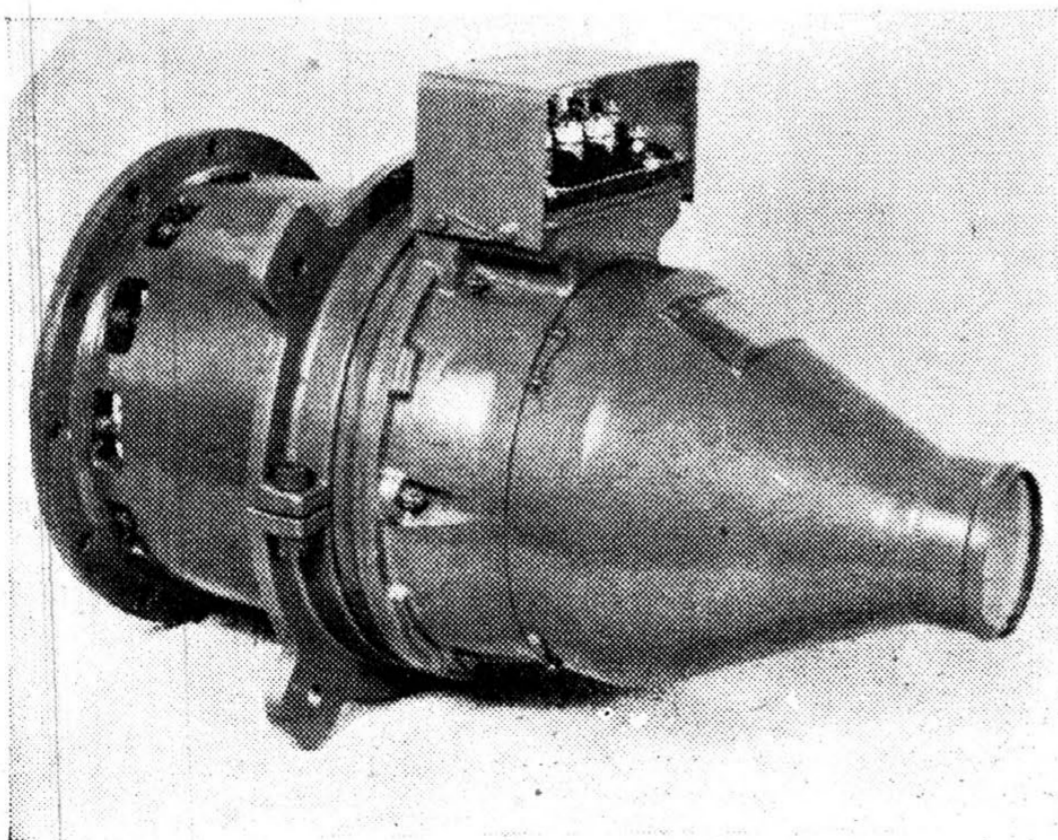
Basic generating units are main engine-driven alternators rated at 40 kva at 75 per cent. power factor. They are designed for parallel operation when suitable speed-controlled drives are provided. Four such units provide 120 kW (160 kva) and require distribution lines rated approximately at 440 amperes. By contrast, the familiar "24-volt" system, operating at 27 volts, would require copper to carry 4,400 amperes. For long conductor spans, where regulation rather than thermal capacity determines the size of conductor required, the single 27-volt conductor would require 17 times the copper that is required for all three of the 208-volt conductors.

Factors of Selection

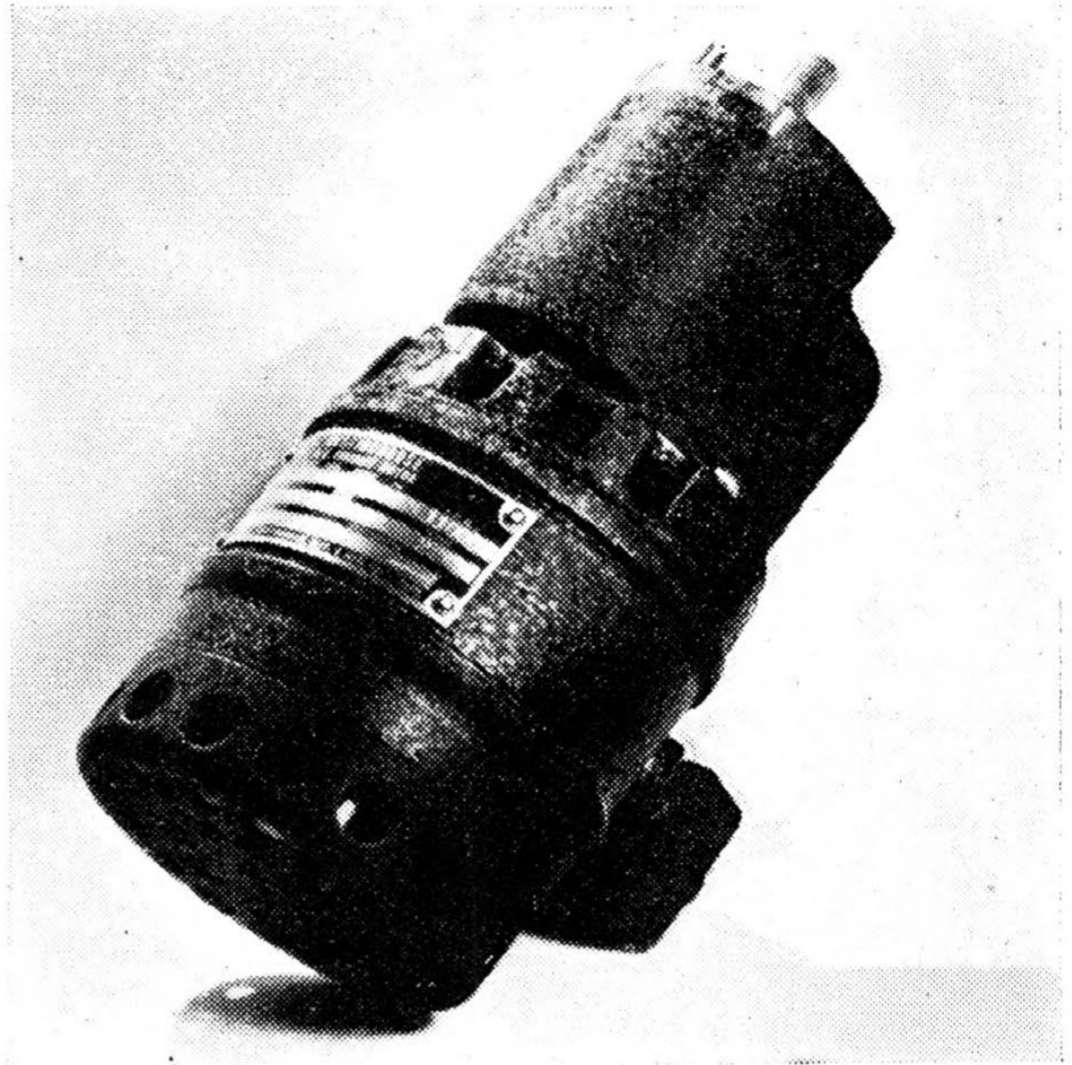
Motors are of course polyphase. They are operated grounded-neutral so that they will develop partial ratings with one line shot away, and will continue to run at light load with two lines shot away, although they will not restart under the latter condition.

Availability of A.C. systems does not mean that all large aircraft will or should use them. In selecting the system best suited to a particular machine, many factors must be considered, the size and electric power requirements of the aircraft being two of the most important factors. Functionally, an aircraft is a device for carrying payload from point A to point B, and systems must be studied primarily to determine the overall effect they will have on payload capacity. Installation weight, fuel consumption, and, for a military machine, the probability of its reaching its destination, must all be considered in determining this. Although a military aircraft must be designed to meet certain specific tactical requirements, like any other machine, once it is designed, it will lift a certain gross load. The combined weights of aircraft, equipment, fuel, and payload must not exceed the total lift. Fuel consumption for operating equipment may be of far more consequence than the equipment weight for operation over extreme ranges.

Reliability is fully as important as weight. Payload capacity achieved at the cost of reliability is not a good investment; capital would be expended faster than the fictitious high rate of return could ever justify. Where possible, of course, the designer will provide the spares necessary to assure the return of the aircraft even though some vital device fails because of enemy action or because of its inherent weakness. The weight of this reserve



40-kva alternator showing mounting flange, support brace, terminal board and air inlet.



400-cycle gear motor rated at 200 inch pounds at 27.5 r.p.m. with breakaway torque of about 600 in. lb.

equipment must be subtracted directly from payload capacity. Remaining deficiencies in reliability must be made up by supplying additional machines and crews.

Conversely, an improvement in reliability cuts down losses. "All-electric" aircraft, according to the U.S.A.A.F., are much less vulnerable to combat damage than are hydraulically equipped machines. This is one of the reasons for the military importance of electric systems, since the transition from hydraulic to electric operation of actuators and accessories is a major factor in the expansion of electric power requirements on large aircraft. The only other factor of comparable magnitude is the great increase in the use of radar devices. The B-29 Superfortress, although equipped with a 24-volt D.C. system, is considered to be the first all-electric aircraft, and has the largest electric system capacity of any machine regarding which information has been released.

Payload and Maintenance

Neither comparative reliabilities of 24-volt and 120-volt D.C. equipment, nor the comparative reliabilities of 120-volt D.C. and 208-volt A.C. equipment have yet been established by operating experience, although some experimental and much theoretical evidence is available on these subjects. In general, the absence of brushes and commutators on motors will increase reliability, and it is generally admitted that circuit interruption problems will be less with alternating current than with direct current at comparable voltages.

Closely related to reliability is the factor determining the time an aircraft will be grounded for maintenance. This factor may be evaluated as the payload utilisation factor. An aircraft does not carry out its function of delivering payload while a service crew is struggling with its electric equipment, or with any other equipment for that matter. As the intricacy of the equipment increases, the time for ground maintenance is very likely to increase in proportion. Some of the equipment proposed for A.C. power systems is admittedly much more intricate than equipment now being used for 24-volt systems. Too much should not be made of this point, as 24-volt equipment is also growing more intricate as new requirements develop.

Although actual service will tell the final story, some predictions regarding maintenance have been made for actual or anticipated designs on the basis of such general considerations as the number of parts involved, the necessity for abnormally accurate tolerances, likelihood of exces-

sive temperatures, vulnerability to combat damage, and ability to withstand abuse and improper operation. Evaluated on this basis, constant-speed drives and synchronising controls appear likely to require somewhat greater maintenance and a somewhat higher standard of technical ability to operate them than do any components of the existing 24-volt systems. Motors for use with A.C. systems, on the other hand, will require considerably less maintenance than D.C. motors now require.

So far, electric systems have been discussed rather generally as to the effect that the system may have on the aircraft as it carries out its primary function of carrying payload. For proper overall perspective, it is now necessary to consider the fact that all large aircraft carry some equipment which must be operated from direct current and some equipment which must be operated from alternating current. Solenoids and some forms of control apparatus function best when designed for direct current, whereas many instruments and all high-power radar equipment operate from alternating current. Regardless of the type of power provided for the main system, conversion equipment will be required to suit many of the devices to be operated. Where possible, of course, devices will be designed to operate from the basic power supply without the use of conversion equipment. Although an A.C. motor will weigh about 60 per cent. as much as an equivalent D.C. motor, it will not pay to install an inverter to permit the use of A.C. motors on D.C. equipped machines unless compelling reasons other than weight exist. On the other hand, radar tubes require power at a D.C. potential of many thousand volts. The lightest and most reliable method of obtaining this power is by transforming high-frequency A.C. power to a suitable voltage and then rectifying it to provide the required D.C. potential. The weight required on D.C. aircraft for inverters or for special alternators provided solely for radar operation is considerable, but it is negligible compared with that required for D.C. generation at the necessary voltage.

Constant-speed Device Needed

With so much progress in developing equipment for A.C. systems already recorded, it is necessary to report that one tremendous obstacle has not yet been overcome. In *Machine Design* for June, 1941, Dr. E. E. Minor writes on the subject of "high-frequency power for aircraft" and points out the need for a constant-speed device to couple the alternator to the main engine. Not much more can be said in 1945, at least at this writing. The variable-stroke, friction-drive device to which Dr. Minor alluded was abandoned some time ago, but there are at least three hydraulic devices which bear some promise of success, although at much higher weights than were originally contemplated. Recent developments in the gas-turbine field also suggest that an auxiliary gas turbine may be a suitable prime mover in spite of high fuel consumption, and that development of such a turbine may make it possible to abandon the long quest for a constant-speed drive.

It is thought that A.C. systems will be justified for high

values of connected load, and for aircraft a large size with power-transmission distances exceeding 100 or possibly 200 feet. The dividing line between preference for D.C. systems and preference for A.C. systems is not too clearly established, and will shift somewhat according to the success in developing an alternator drive, and, as pointed out previously, according to the particular make up of the utilisation devices required on the machine.

One question of paramount importance cannot be answered at this time, namely: When will the new A.C. system be in actual operation? Some of the urgency has disappeared since 1942. Then

again, much of the early impetus came from the high-altitude brush problem, a major obstacle to D.C. apparatus in 1942, now also a forgotten problem thanks to the work of Dr. Howard Elsey, of the Westinghouse Research Laboratories, and his associates. Even so, with so much of the equipment already completed, it does not appear that flight tests will be long delayed, although it is admitted that the first installations cannot be as complete as proponents of the A.C. system would like to see them.

Preparing for Change

If this prediction is correct, it behoves the designers of aircraft accessories to be ready with A.C. versions of aircraft electric equipment. In general, conversion of existing D.C. motor-driven devices will be relatively simple, and in most cases, the A.C. powered device will be simpler, lighter and easier to maintain than its D.C. counterpart. Often, an A.C. motor will merely be substituted for the D.C. motor, with negligible modifications of the accessory. Many designers, however, will want to take advantage of the possibilities inherent in A.C. motor application by redesigning the accessory for a higher motor speed.

The most popular speed for D.C. motors is probably 7,500 r.p.m.; 11,500 r.p.m. is expected to be the most popular speed for 400-cycle motors, although conservative designers may hesitate to exceed 7,500 r.p.m. except for intermittent ratings or for continuous ratings below one horse-power. Very large motors are likely to warrant special lubrication systems which will permit operation at 11,500 or 23,000 r.p.m., speeds which are already exceeded on gas-turbine compressors and on superchargers.

Use of built-in A.C. motor parts is considerably simpler than is the case with D.C. motor parts, since no brush rigging is used. As a compromise between motor parts and complete motors, the U.S.A.A.F. are sponsoring the development of "three-quarter" motors, the bearing housing for the drive-end being a part of the accessory instead of being part of the motor. This method of construction saves some weight compared with complete motors, and facilitates motor replacement compared with integral motor parts, but is being resisted by many manufacturers because it complicates problems of ventilation, factory testing, and responsibility for satisfactory operation. Standardisation of three-quarter motors is considerably more difficult than standardisation of complete motors, since many internal features of motor design are affected.

A.C. ELECTRICAL SYSTEMS (CONTINUED)

Book Review

Air Power for Peace. By Eugene E. Wilson. McGraw-Hill Book Co., Inc., New York and London. \$2 net.

NO, Mr. Wilson, you are not correct on page 21 of your book where you speak of Radar as "American-invented." It was a British invention. Likewise it is not accurate that in 1918 the French had "the largest and perhaps the best air force in the world" (page 22). The Royal Air Force was then the largest, and few with knowledge will doubt that it was the best.

There are other points in this book to which we might take exception, such as the omission (on page 119) to mention that Bomber Command of the R.A.F. was active, as well as the Fortresses and Liberators, in helping the invasion of Normandy,

and the remark on page 133 that "the failure of the guns in this action (i.e., against the *Bismarck*) is significant." The guns did not fail; it was the guns of H.M.S. *King George V* and *Renown* which silenced the *Bismarck's* turrets and left her helpless. Then it was obviously more economical to use marine torpedoes for the *coup de grâce*.

The main contention of this book, that air power consists of the three elements of air forces, air transport and aircraft production is interesting and sound. The description of how American aircraft industry was built up is an instructive section, and the outline of the war has value for reference purposes. Based on history, it is a book which looks ahead. It is not easy reading, but it is certainly a book of merit.

A SYMBOL OF GOODWILL

AT a Wings presentation ceremony on the Royal New Zealand Air Force Station at Wigram, Sir Cyril Newall, the Governor-General, as a Marshal of the Royal Air Force, recently presented a gold cup from the R.A.F. to the R.N.Z.A.F. as a token of goodwill and esteem. The cup was received by Air Vice-Marshal L. M. Isitt, Chief of the New Zealand Air Staff.

The Governor-General said that just as the cup made of gold had been tested in a furnace, so had the comradeship of the two Services been tested in war. The Royal Air Force, he said, had earned a high reputation among both friends and foes—a reputation shared by the R.N.Z.A.F. and by New Zealanders serving with the R.A.F. all over the world. New Zealand had a high and noble share in the contribution made by the R.A.F. towards victory.

In five and a half years, for instance, Bomber Command

flying from England alone and disregarding all other operations, had suffered 47,500 killed. It was a high price, but it shortened the war by two years, and there was no doubt that it had reduced by hundreds of thousands the casualties which sister Services might have suffered. In that New Zealand had played a notable part.

Air Chief Marshal Sir Arthur Harris, who commanded Bomber Command, had written to him stating "how very, very good and efficient were all my New Zealand crews. The pick of the bunch and a good bunch to be the pick of." That was a testimonial indeed from a very high authority and it had been justly earned and fully merited.

"And so I say," the Governor-General added, "guard this cup. Treasure it. Keep it in mind always as a symbol of sincere goodwill, of very great comradeship and of a very great cause."

COASTAL COMMAND ESCORTED TRUMAN

R.A.F. COASTAL COMMAND shared in the task of escorting the convoy bringing President Truman to Europe. As the American cruisers neared Britain, aircraft of the Command took off to escort the ships. The patrols were carried out by Sunderlands of the Royal Australian Air Force operating under Coastal Command, and by R.A.F. Warwicks.

The aircraft were from a group commanded by Air Vice-Marshal F. H. M. Maynard, C.B., A.F.C.

PASSING-OUT PARADE AT HALTON

MARSHAL OF THE ROYAL AIR FORCE SIR JOHN SALMOND, G.C.B., C.M.G., C.V.O., D.S.O., took the salute last week of 1,200 aircraft apprentices at a parade at R.A.F. Station, Halton, Buckinghamshire. The occasion was the passing out of a course of aircraft apprentices consisting of fitters, fitter-armourers and instrument makers.

The apprentice in charge of the parade was Sergeant/Apprentice R. Meadow, of New Brook End, Berkeley, Gloucestershire, who later received from Sir John Salmond the prize for the outstanding sergeant apprentice of the entry.

The Elliott Memorial Prize for highest marks in the general studies examination was awarded to Sergeant/Apprentice J. C. Ainsworth, of 75, Chaplin Road, Wembley, and prizes for the best fitter-airframe and the best in educational subjects were won by Aircraft/Apprentice R. Ravine, of 67, Ruskin Road, Shadwell St. Mary, Essex.

Ninety-seven apprentices from the entry have been recommended for aircrew duties.

MOTHS FOR CANADIAN CLUBS

OUT of a total of 389 Service aircraft with spare parts, which have been sold by the War Assets Corporation during the past year, and which have realised nearly \$2,400,000, over 200 were bought by the Royal Canadian Flying Clubs Association. They will eventually be resold to member clubs in the Dominion.

The aircraft, which are all de Havilland Tiger Moths, were previously used as trainers for the Commonwealth Air Training Plan, and were sold complete with one spare motor apiece and sufficient extra parts to keep them serviceable for at least two years.

Before being resold to the individual clubs, the aircraft must be fully reconditioned to comply with the Department of Transport licensing regulations. It is expected that they will be sold to the clubs at cost price plus the reconditioning expenses.

The Royal Canadian Flying Clubs Association, which maintains offices in Ottawa, acts as a general clearing house for twenty-two local flying clubs throughout Canada.

SOME YORK JOURNEYS

SINCE hostilities ended in Europe, air transport has played a big part in the rehabilitation of the liberated countries, in the administration and occupation of ex-enemy territory, and in the building-up of the forces in the Far East.

The great need for Service air transport was realised when America entered the war and the tide turned in Africa. Vast distances had to be covered and communications kept open across oceans and continents, and the transport aircraft came into its own. Here the Americans had a flying start. The

Douglas Dakota had been the standard transport machine on their continental airways for some years. Large numbers of these aircraft were available and production was stepped up. A larger type, the Douglas Skymaster, was also put into production, and there was soon a steady stream of transport aircraft crossing the Atlantic.

Apart from a limited number of transport aircraft, we then had to rely almost entirely on the American-built machines. When Transport Command was formed, the need for more and bigger aircraft, capable of carrying heavy loads and flying long distances, was immediately apparent.

After much official hesitation and procrastination, the Avro York was put into production, and to-day these aircraft are performing prodigious undertakings as a matter of routine. Recently a York aircraft flew from England to India in a little over 30 hr., carrying a heavy load of urgently needed supplies to South-East Asia Command. Another accomplished the journey from Ceylon to London in 60 hr., and from India in 34 hr. flying time.

Another York, flying non-stop from London to Cairo in 10 hr. 25 min., averaged 238 m.p.h. for a distance of 2,450 miles, carrying six passengers, a crew of six, and 6,700 lb. of diplomatic mail.

In April this year a freighter version completed the round trip from England to Calcutta and back in an overall time of four days 15 hr., travelling by way of Malta, Cairo, Shaibah and Karachi, and returning over the same route. The 12,638 miles were covered in a flying time of 60 hr. 40 min., an average speed of 208 m.p.h.

The York, despite its excellent record, must not be considered as other than a wartime compromise. Ease of production was a cardinal principle of the design. To achieve this, at a time when all labour was devoted exclusively to the production of operational types, A. V. Roe's had recourse to the basic design, and the jigs and tools, of the successful Lancaster bomber.

The wings, engine nacelles and undercarriage, the tailplane, fins and rudders are, it will be remembered, identical with those of the Lancaster, but the fuselage and such detail modifications as the central tail fin are new. The gross weight is 65,000 lb., or approximately 30 tons.

In the passenger York there is seating accommodation in two cabins for 24 persons, with wardrobe and toilet-room space between these two compartments. A well-equipped kitchen is arranged aft of the rear seating compartment and behind that there is a roomy baggage compartment.

The York has a range of over 3,000 miles, a cruising speed of 275 m.p.h. at 21,000ft., and a maximum speed at the same altitude of a shade under 300 m.p.h.

DEFERRED "Y" SCHEME CANDIDATES

AS a result of the Fleet Air Arm training in Canada coming to a halt this summer and aircrew-training taking place in Britain, thousands of "Y" Scheme candidates for the F.A.A. will be put on a waiting list and deferred, possibly until next February, although due for call-up in August.

During these six months the entrants may be called up as civilians for approximately a week in order that they may be tested for flying aptitude, after the style of the R.A.F.V.R., which has been furthering this method for the last two or three years. Many potential aircrews in the Air Force have been given jobs in Government offices until they come off the R.A.F. waiting list and begin their training.

A Record of Achievement

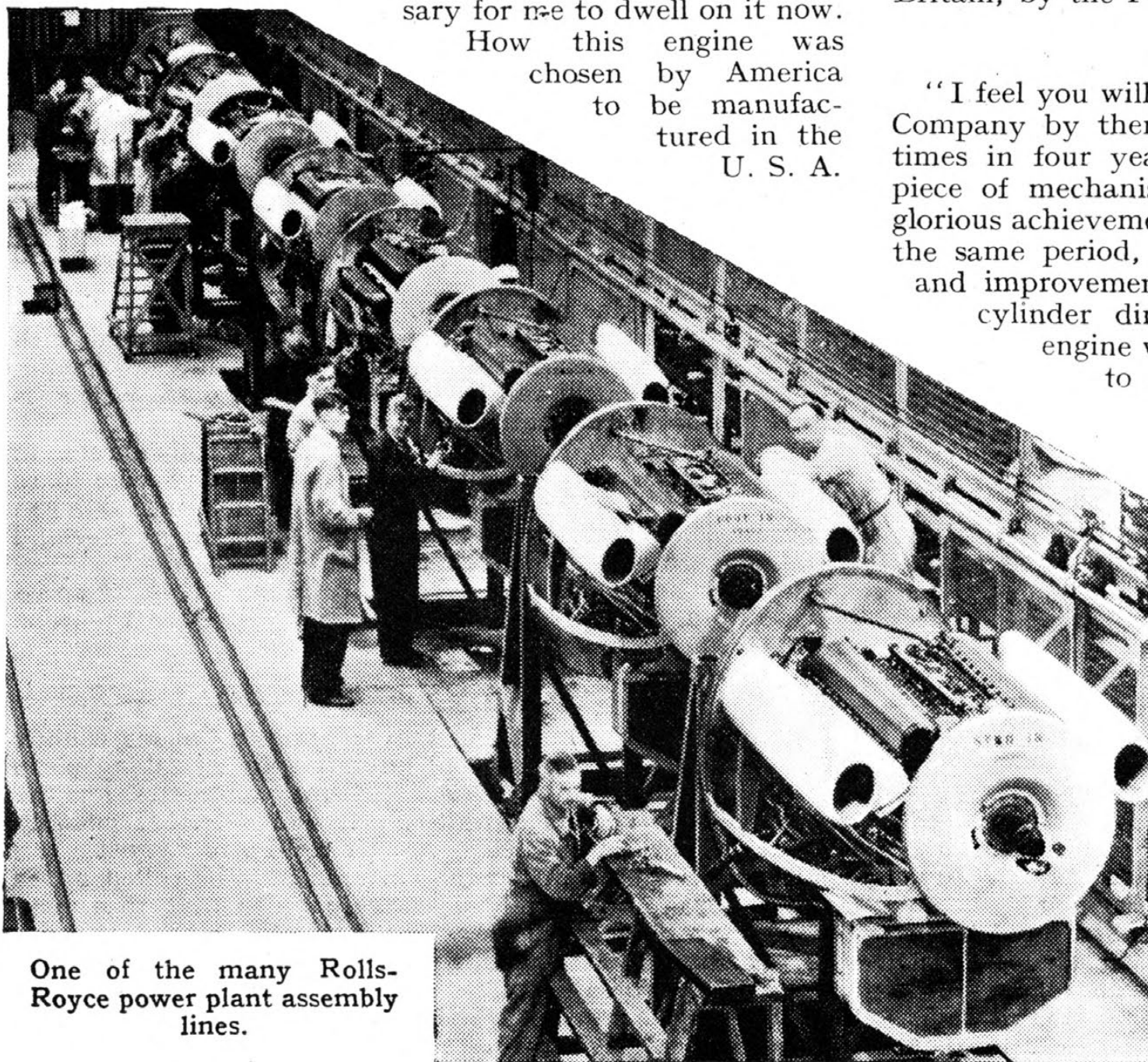
Chairman Reveals Something of What Rolls-Royce Accomplished During the War

AT a luncheon in London (as mentioned briefly last week) the chairman of Rolls-Royce, Ltd., gave a glimpse of the tremendous expansion which his firm achieved between the outbreak of war in 1939 and the end of the war with Germany in May of this year. Captain E. C. Eric Smith, M.C., stated with justifiable pride that, as in the first World War, Rolls-Royce officials and workmen had again justified the faith placed in them by the nation and had demonstrated their ability to beat the best the enemy could bring into battle.

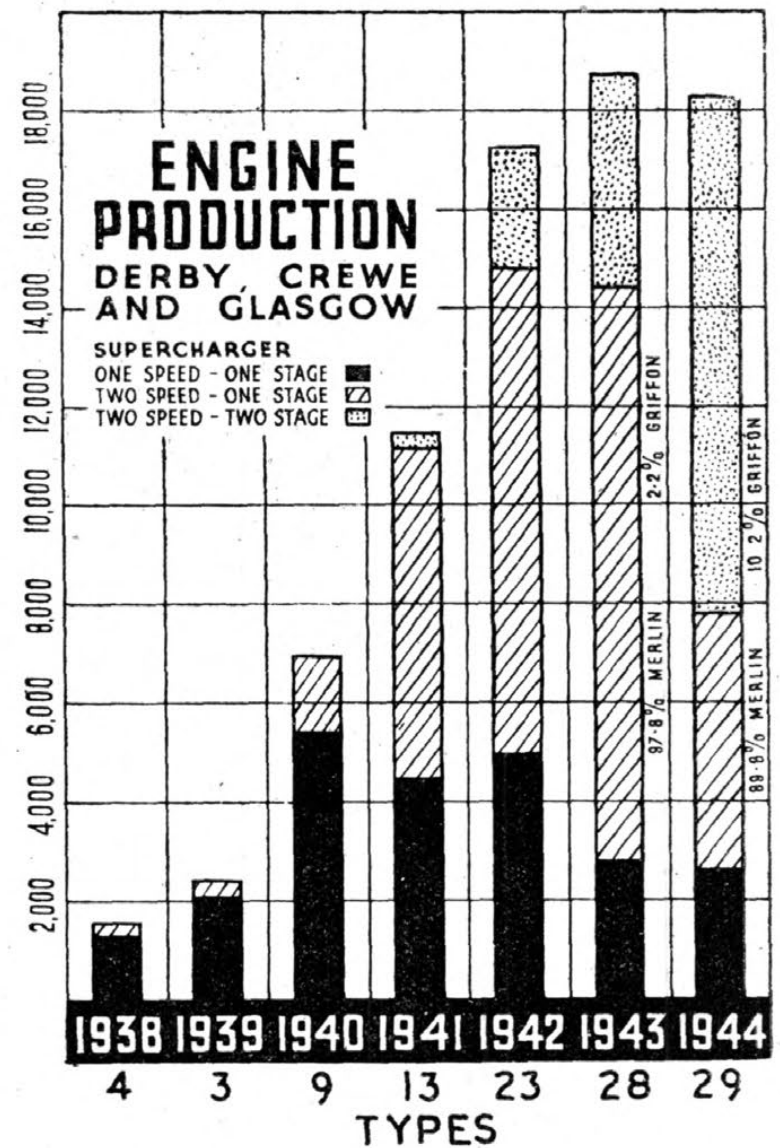
"Statistics," Capt. Smith said, "are dry things to everyone except statisticians, but I would like to convey to you, very simply and briefly, the salient features of what Rolls-Royce have done from the beginning of the expansion period which immediately preceded the war up to the end of 1944. As our datum we must go back to the years 1935-6, when the war clouds began to gather. At that date we employed just under 8,000 people in a covered area of just over 800,000 square feet. By the end of 1944 these figures had risen to 57,000 people in a shop area of 7¼ million square feet. That is to say, in less than ten years we had multiplied our staff over seven times and our shop area nine times. These figures do not include the employees and factories of our 500 sub-contractors who, in their turn, employ an almost like number of sub-sub-contractors. The assembly, organisation, and in many cases training, of this huge additional force, has been by itself a prodigious undertaking.

"The fame of our Merlin engine has been so widely acclaimed that it is hardly necessary for me to dwell on it now.

How this engine was chosen by America to be manufactured in the U. S. A.



One of the many Rolls-Royce power plant assembly lines.



Graph showing the rise in Rolls-Royce output from 1939 and onward through the war years.

for installation in American-designed and built aircraft is now a matter of history. The rate at which these engines have been produced is not, however, common knowledge, and some figures may therefore interest you. In 1943 the combined Derby, Crewe and Glasgow factories reached an output of 18,000, nine times the 1939 figure. Despite the opinion expressed by certain engineers that the Merlin was not a practical bulk-production proposition, we were able to announce the 100,000th engine delivered on March 29, 1944, and to-day I can tell you that by the end of the European War over 150,000 Merlin engines have been turned out. (These figures include not only those made in the factories under the direct control of Rolls-Royce, but also those produced in U.S.A. by Packards and, in Great Britain, by the Ford Motor Company.)

Output Doubled

"I feel you will agree with me that, for the Rolls-Royce Company by themselves to step up the production nine times in four years of such a complicated and delicate piece of mechanism as an aircraft engine is in itself a glorious achievement. But this is by no means all. During the same period, as the result of intensive development and improvements in design, but without increasing its cylinder dimensions, the maximum power of the engine was actually doubled. We had, therefore, to reconcile at one and the same time the radically opposed demands of mass production with the introduction of the important changes in design necessary to enable the engine to produce double its original power.

"Early in the war it became apparent that the facilities which had been envisaged for the repair of engines were going to prove entirely inadequate, and measures to remedy the position became of the utmost urgency. As you will have gathered, our factories were more than fully occupied with the new engine programme to which I have just alluded. We were fortunate, however, in obtaining the services of certain first-class organisations who, though they had no previous experience with Rolls-Royce engines, were ready to learn from us, and who set about the repair problem

with a will until the figure of overhauled engines rose from a few hundred in 1939 to over 18,000 during 1944.

"You will realise that with such a number of engines operating under wartime conditions all over the world, the demand for spare parts would be stupendous; as indeed it was. Here, again, this call had to be met without hindrance to new production. Naturally the demand advanced as the war proceeded, and whereas one million pounds' worth sufficed in 1939, in 1944 eleven times this figure of one million pounds hardly filled requirements.

"Just before the war it became apparent that, in order to ensure the satisfactory functioning of our engines, it was necessary for us to devote our own engineering skill to their installation. In the past this matter, so vital to us, had been left to the aircraft constructor, who was already overburdened with the solution of countless other problems in connection with aircraft construction, performance and equipment. Whether an engine fails owing to the defective design of a bearing, or is destroyed owing to loss of coolant consequent upon a defective 'plumbing' system, the result to the unfortunate flying man is the same. We decided, therefore, that we must accept the responsibility for everything affecting the functioning of the engine right back to the points where the complete power plant is attached to the aircraft. By taking over the control of the design, development and production of complete power plants we have been able to test out the complete unit both on the test bench and also in the air. The result has been not only an increase in reliability but also improvement in the efficiency of the various components, including the engine itself.

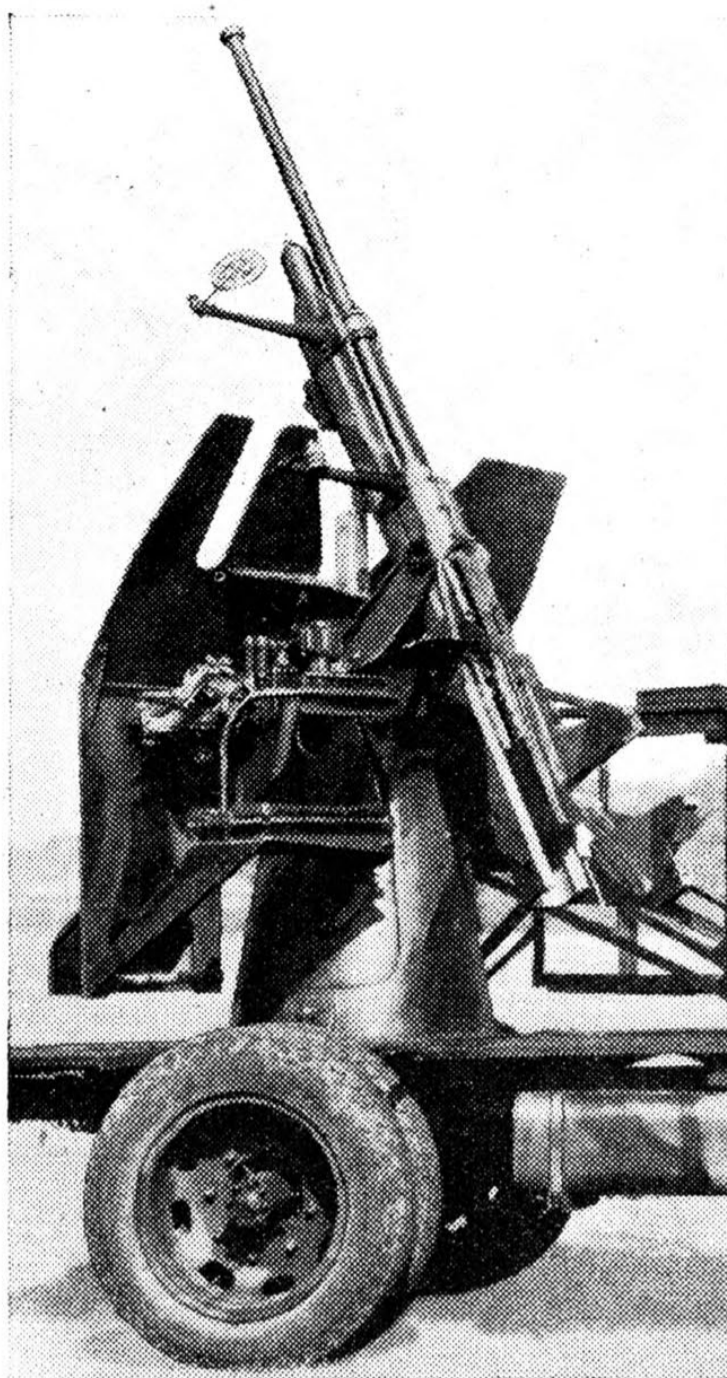
Power Plant Growth

"Our enterprise in tackling the complete power plant and developing it into a quickly detachable interchangeable unit has won the admiration of our American friends, and has been publicly acclaimed by them as one of the outstanding achievements of British aviation during the war.

"Here again the measure of our success can be gauged by the enormous expansion of business. In 1939 we produced a little over 100 complete power plants. In 1944 the output was nearly 14,000. Our own capacity was inadequate to handle the huge demand, and we had, therefore, in the main to rely on sub-contractors, all of whom had to be educated in this new technique. The power plants for all Merlin-engined aircraft of the famous Avro Lancaster type and its descendants have been built to Rolls-Royce designs.

"Most of the foregoing remarks apply to our world-famous Merlin engine. There is, however, another member of the Rolls-Royce family which has already 'won its spurs' in this war and is destined to rival its older brother in renown. I refer to the Rolls-Royce Griffon engine. This engine, 23 per cent. bigger than the Merlin, supplied in a power plant designed and built by Rolls-Royce, is already being used in large numbers by the Fleet Air Arm in the Fairey Firefly. Now that the war has moved to the Far East, with its wide ocean spaces, the largely increased use of this first-class combination of engine and aircraft is certain to ensue.

"The Griffon engine has also been used operationally in later Marks of the Supermarine Spitfire with highly suc-



The Rolls-Royce 40 mm. cannon which were on test within twelve months of being designed.

cessful results. The majority of the front-line aircraft have been, throughout the war, powered by Rolls-Royce engines."

Capt. Smith then recalled that the ubiquitous Merlin had found other fields to conquer, such as in motor torpedo boats and tanks. The Merlin, derated and converted for the latter use, became known as the Meteor and was rated at 600 h.p. It replaced the 350 h.p. Liberty engine, and the extra power had its effect on parts of the tank, which were redesigned by Rolls-Royce engineers. One of the fruits of their collaboration was the Cromwell tank.

The Rolls-Royce school of instruction at Derby, Capt. Smith said, had trained nearly 17,000 people in the use of R-R. products. These included pilot officers, flight engineers and ground personnel of the R.A.F. and Fleet Air Arm, and representatives of the air forces of most of our Allies.

In last week's issue we referred to Capt. Smith's remarks on the subject of private enterprise. We feel that they deserve to be read by a wide circle and are, therefore, publishing them in full. On this subject he said:—

"In passing, I think it is desirable to touch on a subject which has become one of acute political controversy at the present time. I refer to nationalisation of industry and more particularly of those branches concerned with the production of armament. Without entering into the political arena to battle either on the side of nationalisation or private enterprise, let us for a moment examine the facts and see what advantage would have accrued to the nation if Rolls-Royce had been a national factory under full Government control in the years between the two wars.

"In the early 1920's, right up to 1927, Rolls-Royce were practically without Government support so far as new designs of aircraft engines were concerned. Our aircraft engine department eked out a precarious existence on the proceeds of contracts for overhaul and supply of spares relating to obsolete types of engines produced for the first World War.

"In 1925, at our own risk and on our own initiative, we designed and later produced the prototypes of a 500 h.p. engine known as the Kestrel. This type of engine, which was later ordered in large quantities by the Government, provided us with the basic design information and technique which has been incorporated in all the engines we have produced since.

Private Venture

"In 1932 we decided that a larger engine than the Kestrel would certainly be required. Again at our own risk and on our own initiative, we designed and produced prototypes of an engine we called the P.V.12. The P.V.12 is better known to you as the Rolls-Royce Merlin, the engine which provided the power for *all* our protecting fighters throughout the Battle of Britain.

"In the light of the above indisputable facts, I leave it to you to decide what you think would have been the outcome of the Battle of Britain, and, in consequence, the fate of our nation, if Rolls-Royce had been nationalised and there had in consequence been no Merlin engine.

"Let me give you a further example of the results of private enterprise as practised by Rolls-Royce. Some years before the war we observed that the guns used in aircraft were mostly made to foreign designs. Our view was that

A RECORD OF ACHIEVEMENT

this state of affairs was not in the national interest. We therefore approached the Air Ministry in 1938 and suggested that we should examine the possibility of designing and producing an All-British gun of 0.5in. or 30 mm. calibre. Our proposals were agreed to in principle, but we were informed that the gun should be at least 40 mm. bore. We completed our designs to the latter figure, and prototypes were doing well on test within twelve months. Owing to changes in Government policy dictated by operational requirements, our gun was not put into production for aircraft. Shortly after Dunkirk, however, the Navy became interested, and after submitting the gun to exacting tests were so satisfied with it that a contract for a considerable number was placed with us. We received this contract only fifteen months from the date when the gun was first put on the drawing board. By this time others in the armament industry, stimulated by our efforts, were reaching the production stage with designs of guns which duplicated our own, and we therefore retired from this branch of our activities to concentrate on our more immediately important business of designing and producing better and better engines.

Birth of Rotol

"It is sometimes stated that nationalisation avoids the wasteful competition which is considered to be the inevitable accompaniment of private enterprise. This may have been so in the past, but not in these days of commercial enlightenment. Perhaps there is no better example of the desire of modern industry to avoid duplication of effort than is expressed by the formation of the Rotol organisation. Doubtless most of you are aware that the word "Rotol" is a contraction of the names Rolls and Bristol. In the early 1930s both the Bristol and Rolls-Royce companies were conducting experiments on variable-pitch propellers in accordance with the same basic patents. Though we were then, as we are now, in healthy competition with the Bristol company in the development of aircraft engines along quite different lines, we considered that to work in competition along the same lines in propellers was in the interests of no one. We therefore agreed with the Bristol company to pool our technical skill and resources devoted to propellers with their's similarly employed, and on May 13th, 1937, the Rotol Company was born.

"Before passing on to visions of the future, you may be interested to know something about the cash side of our war achievement. As examples, the Rolls-Royce wage

bill for the years 1940 to 1944 was sixty-five million pounds; our turnover for the years 1940 to 1944 was six times that of the previous five years. Perhaps I may be forgiven for adding the less heartening information that 92 per cent. of the profits earned on this huge turnover were absorbed by direct taxation.

"And now what of the future? I cannot to-day tell you about our programme for larger and more powerful reciprocating engines for reasons of secrecy, but I can, I think, safely leave you to imagine that we are not likely to be standing still. For the same reason I cannot give you any detailed information regarding the development we have in hand on the internal combustion turbine and its associate jet propulsion. Let it suffice to say that the first operational British aircraft to use jet propulsion, namely, the Gloster Meteor, is fitted with Whittle type engines developed and produced by the Rolls-Royce organisation.

"Whilst we are actively and successfully competing in the market for civil and commercial aviation, our main business must continue to be to provide motive power for aircraft to be used by the Fighting Services. In what follows I am giving personal opinions only, and am not disclosing an official policy of which we have foreknowledge. It seems probable that the Air Force equipment, as we know it to-day, is obsolescent, and that we are on the verge of developments which show so great a technical advance that re-equipment almost immediately will be inevitable in order to maintain world superiority, particularly in the fighter class.

"There is also another and very far-reaching line of development to which I would like to draw your attention. It is a problem of especial, one might almost say unique, importance to the British Empire. I refer to the air-borne army. The British Dominions have a right to expect prompt assistance from the Mother Country immediately they are threatened. The tempo of modern war does not permit of the use of marine transport over the huge distances we must operate. This war has already shown the versatility of air transport, but I feel we have only just touched the fringe of what can be done. With the development of specialised transports of a load-carrying capacity many times that of anything now in existence, coupled with the provision of military equipment designed on aircraft lines to reduce weight to a minimum, there seems no reason to believe that it would not in the future be quite feasible to transport whole armies by air in one-twentieth of the time required by sea."

PHOTO RECCE IN THE FAR EAST

FLYING through monsoon storms, pilots of Ceylon-based photographic reconnaissance aircraft of the Indian Ocean Air Force are carrying out sorties over a thousand miles of ocean to Japanese-held territory.

In no other theatre of war are photographic reconnaissance aircraft called on to cross such expanses of water; in no other theatre do they operate with such obscure weather information.

Weather is, indeed, the worst obstacle to be overcome, for long-range forecasting is almost an impossibility for the Indian Ocean. The predominating weather comes from east and south. The countries to the east are in the hands of the Japs: to the south there is little but open sea. Time and again, pilots find themselves on the edge or even in the midst of dreaded cumulo nimbus cloud formations which can lift up or toss down even a heavy aircraft at the rate of 1,500ft. a minute.

Typical of the conditions encountered was the experience of F/O. J. I. Jackson, of North Vancouver, B.C., Canada, who with his navigator, F/O. T. E. Knott, of Enmore, Sydney, N.S.W., Australia, carried out one of these long-range "recces." "We crossed over a thousand miles of sea to reach the target," said F/O. Knott. "We circled for over an hour, and during that time ran into quite a snowstorm. This, however, didn't affect our flying, and we carried out the mission successfully."

Photographing from heights of anything between 5,000 and 25,000ft., these aircraft have brought back pictures indicating the presence of Japanese vessels hiding in creeks, and enabled anti-shipping strikes to be mounted with speed.

R.A.F. SCHOOL ON THE DOWNS

AT the R.A.F. School of Air Transport at Netheravon (Wiltshire), Air Commodores, Group Captains, Wing Commanders and more junior officers are studying the lessons of the European campaigns with a view to applying them in the battles ahead in the Far East. The concentrated course at this R.A.F. "University of Air Transport" on the Wiltshire Downs lasts three weeks.

Netheravon is an historic "airborne" station. Here, before D-Day, aircrews of 38 and 46 Groups of R.A.F. Transport Command and the Glider Pilots and Commandos of the 6th Airborne Division were briefed before the great airborne columns took off to secure the first Allied bridgehead in Normandy.

A huge model of the area between Caen and the coast was prepared. On it every meadow, wood and stream was reproduced with every landmark down to the smallest building.

Head of the instructors and lecturers is an ex-Metropolitan policeman who has just been granted a permanent commission in the R.A.F. He left the police a year before the war; now he is Wing Cdr. W. E. Coles, with five decorations for operations in unarmed transport aircraft.

"Indicator" Discusses Topics of the Day

More Space Wanted

Making the Best Use of Available Airfield Facilities : The Position of the Manufacturers : Location and Runway Length for Modern Production

WITH the gradual transfer of war potential to the other side of the globe, the casual traveller by air over this country is already noticing the way in which once busy airfields are closing down, one at a time, as far as flying activity is concerned. Many of them will no doubt be used for aircraft storage on a big scale; some of them will be retained as operational, training and experimental centres; and a few may be taken over either by "contractors" or municipalities. I hate to think how much all these airfields cost the country—but that is the price of war, and all we can do now is to endeavour to make the best possible use of as many of them as possible. Never, in peace conditions, could such large and well-equipped fields have been developed by private enterprise alone, and design progress might have been held up by what I can only call "earthly overheads"—which are probably the most costly of any.

Whether or not the war has caused aviation to run before it had properly learnt to walk is a matter of opinion, but certainly take-off and landing performances have outstripped anything that would have been safely permissible with most of the grass fields used in this country in the years before the war. Since high wing-loading appears to have come to stay, it is up to the Powers-That-Be to see that no useful airfield activities are allowed to go to waste, and that the system is planned so that as few additional areas as possible need to be hacked out to provide new two-mile runs.

Without going too deeply into the question, it seems to me that the manufacturers are in the worst position where flying facilities are concerned, and a good deal of careful planning will be necessary if they, with their experimental departments and test pilots, are going to have the best chance to get on with the necessary work. Whereas a public transport concern can ask for the use of any airfields which are suited to their services and aircraft (and can move thereto lock, stock and barrel, at not too great a cost), a manufacturer will find it much more difficult to take advantage of any "spare" airfields which are up for disposal. Not only will it be almost impossible to uproot the factory and start again somewhere else, but there will be the added difficulty of either moving or re-employing thousands of skilled technicians.

Repositioning

Such vast moves *could* be made, with Government support, and there are probably a sufficient number of airfields in all areas of this country for some of the moves to be made without disturbing the employees' private lives to an unreasonable extent. And it certainly seems that nearly all of the experimental and development departments will need to be repositioned and that a great many of the erecting shops will need to be transferred to the vicinity of larger fields during the next few years. Even if the firms' directors wish that the work shall, for economic and other reasons, be continued on present locations, insurance undertakings will begin to pull long faces and ask for large premiums, and the test teams will, if they are too keen to think of going on strike, end up with nervous disorders of one kind or another. For quite a few years some of the latter have, in the interests of war production, been flying production aircraft and even prototypes out of fields which have really been unsuitable for the purpose.

*These pilots, of course, duly become accustomed to the conditions and, after a few initial qualms, find that "it's

not so bad after all." Not very many people outside the Service realise how, during the days when dispersal to the limit was necessary for survival, larger and larger aircraft were put into smaller and smaller fields by Maintenance Unit test pilots with only very fractional losses through damage. The casual passer-by, seeing Wellingtons, Stirlings, Halifaxes and Lancasters sitting, superbly out of place, among the trees, probably thought that they were dragged there overnight by road. Unless, of course, he happened to be lucky enough to see one or two of them being flown quietly and regardless of wind-direction on to a narrow strip in an area of parkland, to rumble with leaps and bounds towards the end of the all-too-short "airfield." During those difficult days, M.U. pilots used to spend half their flying time fitting big aircraft into small spaces. Nobody, except the local livestock, thought anything much about it.

Aerodynamic Jugglery

But that was war. We can't expect peacetime pilots to make every test flight a piece of aerodynamic jugglery with items as expensive as modern aircraft. They will probably do it without question for a while—and until something is broken, or until an aircraft even more greedy of space is rolling out of the experimental shop.

One has only to go mentally through the list of firms and locations to realise that something fairly drastic will need to be done within the next few years. Nearly all the old-established firms have their original works situated at airfields which, though good enough for the job in the thirties, are now more than a little on the small side—and some of them seem to be absolutely inextensible. Few of them have runways and these may be spectacularly hilly. Of a dozen pre-war locations in my mind at the moment, probably only five, at the very most, have fields available which are either adequate or capable of useful extension—and I am by no means sure of some of all these. Three of the dozen are, to my mind, dangerous for modern types unless a flight goes exactly according to the book.

It is far from being the manufacturers' fault that aircraft take-off and landing speeds have so considerably increased in the last few years—and least of all that builders have sometimes been permitted to clutter up the surroundings and so make extensions impossible. So it will be hardly fair to expect them to pay the enormous bill involved in migration to more suitable areas, or in transporting by road every part of every aircraft to be assembled and flown elsewhere. Things have worked out fairly well so far and they have battled their way past almost insuperable obstacles in obtaining high production during this war. It would be very unkind if they were left to face, unaided, this problem which, if unsolved, is likely to form a most considerable handicap to design and manufacturing progress. I have little doubt that the whole matter is under full control, but we all know far too many people who will be unable to see the reality of the difficulty until failure, in some form, makes the position clear. So often those who have the power and ability to order drastic reconstructions are those who think (perhaps without really thinking) that any old space is good enough and that all "airfields" are, *ipso facto*, satisfactory for all types.

An immediately obvious solution is not as simple as it appears on first sight. Nearly all the wartime dispersed factories are built beside magnificent new airfields; why not transfer to these? Such a transfer might be possible

MORE SPACE WANTED

in a few cases, but most of these factories, though turning out attractive numbers of aircraft, are really only assembly plants, and peacetime economy will demand that as little as possible of the aircraft is made elsewhere than at the home factory. Furthermore, since dispersal was the "object of the exercise," these plants are not necessarily in the most convenient spots for peacetime production, and we run, also, against the personnel problem if we try to trans-

fer, say, two thousand operatives and others from Surrey to Scotland.

Short of replanning and rebuilding on an enormous scale, there appears to be no alternative to the somewhat piecemeal system of manufacturing in one place and completing the final assembly in another, while all prototypes are sent, with the staff concerned, to one or other of the Service two-and-a-half milers for their preliminary trials. There surely ought to be some rather less inconvenient way of getting round the problem. And a problem it will certainly be when the hundred-tonners start flying, if not before.

"INDICATOR."

SYNTHETIC TRAINING

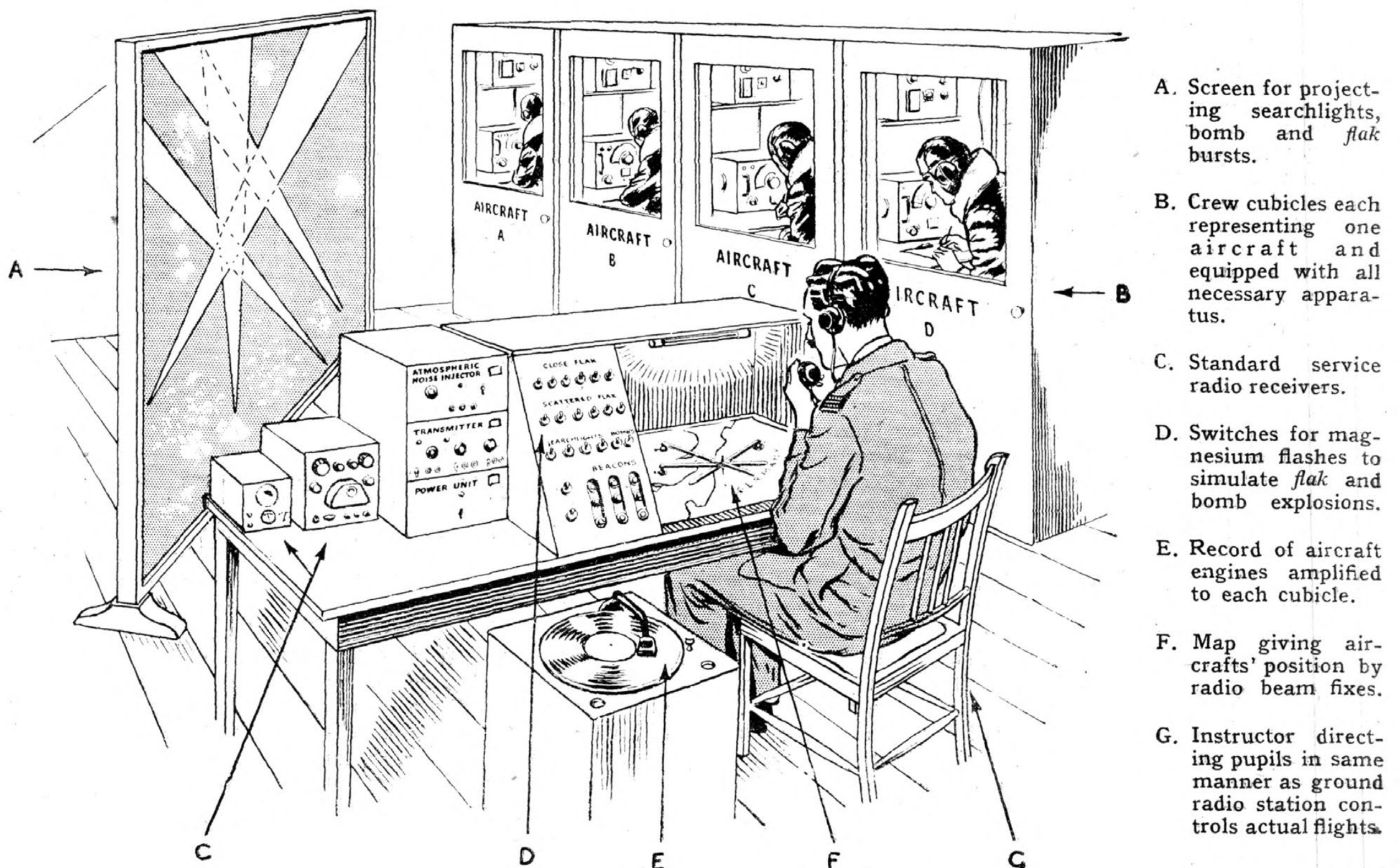
SOME years before the war, mechanical training devices had been used by the R.A.F.—the Link trainer for training pilots was standard practice—but no attempt had been made at the collective training of aircrews by similar methods. Shortly after the outbreak of war a scheme for training bomber crews was conceived and put forward to the Air Ministry by Mr. P. Adorjan, Technical Director of Rediffusion, Ltd. The idea was that the members of an aircrew—pilot, navigator and wireless operator—who had already received individual specialised training in their respective duties, should be brought together in a synthetic trainer which took the form of a cubicle or, in some cases, the fuselage of a bomber, and by means of external apparatus controlled by an instructor, allowed to "fly" a course similar to that which they would meet in battle conditions. The trainer is connected to the instructor by wire, over which he can send not only all the various messages that might be necessary on "ops" but also reproduce the different kinds of interference which are liable to take place during a flight. He can give the crews practice in operating procedure, including wireless and celestial navigation, and teach them how to fix their position by these methods; he can also reproduce the aural and visual effects the crew would experience on the way to and near their target. Projected cinematograph pictures give them fleeting glimpses of the land

or sea below them. Stars are simulated by means of spots of light reflected in mirrors, and sound and light effects reproduce the impressions of enemy searchlights, *flak* and bomb bursts.

As the ether must not be jammed by training radio signals "wired wireless" is adopted for all communication and navigational parts of the Rediffusion trainer. The accuracy in navigation attained is of the same order as that gained in actual practice. Further, in order to get the maximum results with the least number of instructors, five or more bomber crews "fly" the course in each trainer at the same time under the supervision of instructors.

Early in 1940, the Air Ministry decided to proceed with the idea, and from then onwards the maximum amount of help in the development and practical use of the apparatus was given to Rediffusion by the Air Ministry.

The first apparatus was completed and installed at an R.A.F. Operational Training Unit in 1940, during the Battle of Britain. Shortly afterwards, hundreds of similar sets of equipment were manufactured and installed in Great Britain. A significant sidelight is that most of this was made in London during the blitz of 1940-41. Thus, the British workers who made the apparatus share the credit with the British brains that conceived and developed it. Equipment was later also produced in Canada, and sets were sent to the Middle East, South Africa and India.



- A. Screen for projecting searchlights, bomb and *flak* bursts.
- B. Crew cubicles each representing one aircraft and equipped with all necessary apparatus.
- C. Standard service radio receivers.
- D. Switches for magnesium flashes to simulate *flak* and bomb explosions.
- E. Record of aircraft engines amplified to each cubicle.
- F. Map giving aircrafts' position by radio beam fixes.
- G. Instructor directing pupils in same manner as ground radio station controls actual flights.

Reports and Memoranda

Summaries of Recent Issues Printed and Published

by H.M. Stationery Office

R. and M., 1918: Natural Frequencies of Vibration for a Wing Carrying Wing Engines. By G. C. J. Dalton, B.Sc., B.E.(N.Z.), F.S. Shaw, B.E.(W. Austr.), and R. V. Southwell, F.R.S. 28 pp., 1 diag., July 15th, 1940. 4s. net.

A previous paper by Dalton and Shaw dealt with the calculation of natural frequencies for a particular engine mounting, and the present paper deals with a similar problem where the engines are carried on a wing.

The data in effect reduce the wing to a system having six degrees of freedom. The six natural frequencies, together with the associated nodes, have been determined (i) when both wings vibrate in phase, so that the fuselage pitches but does not roll, and (ii) for anti-phased vibrations which roll but do not pitch the fuselage.

The methods employed are natural extensions of Southwell's "relaxation" technique. An essential feature of the relaxation treatment is its presentation of computations in tables.

R. and M., 1922: The Stabilisation of Struts by Lateral Support. By H. L. Cox, M.A., F.R.Ae.S., of the Engineering Division, N.P.L. 8 pp., 1 diag., January 31st, 1941. 2s. net.

It is shown in R. and M., 1923, that the weight of the most economical strut necessary to transmit a compressive load P over a distance l is a function of the "structure-loading coefficient," P/l^2 , and of the properties of the material. At low values of structure-loading coefficient this minimum weight may considerably exceed the weight of material which would be necessary if buckling of the strut could be prevented. Accordingly, it may be possible to reduce the total weight of the structure by bracing the strut laterally to any points of support which may be available. The possibility of saving weight in this way obviously depends on the value of the structure-loading coefficient and on the disposition round the strut of the possible points of support. The present note discusses the conditions governing this possibility.

Two cases are considered, that of a strut free to deflect laterally in any plane, and that of a strut constrained to deflect in one plane only, and the bearing of the results on the problem of a bent beam is discussed. The use of lateral ties to stabilise struts at low values of structure-loading coefficient may result in a considerable saving of weight, even in cases where the length of the ties considerably exceeds that of the strut. In the case of an unrestrained strut, weight may be saved by bracing provided that the ratio of the length of each tie to the length of the strut is less than a quantity given by a simple formula.

R. and M., 1923: Structures of Minimum Weight. By H. L. Cox, M.A., F.R.Ae.S., and H. E. Smith, B.Sc., of the Engineering Division, N.P.L. 34 pp., 10 diag., November 30th, 1943. 6s. net.

An attempt is made to set up standards of optimum efficiency for certain simple structures on a basis of minimum weight.

The dimensions of a structure are divided into two groups, the values of one group being specified *ab initio*, the values of the other being variable to meet the loading conditions specified. It is shown that the number of variables in the latter group is reducible to the number of possible modes of failure, and a logical procedure for fixing the values of these variables so as to make the total weight of structure the least possible is developed. It is shown that this minimum weight depends on the qualities of the materials of construction and on the "structure-loading coefficient." The nature of this dependence is established for examples of tie-bars, struts, wide struts, grid frameworks and stiffened panels.

The conclusions are summarised in several formulæ and diagrams. Whereas the specific weight (weight per unit length divided by the load) of a tension member is an increasing function of its structure-loading coefficient, that of a compression member is a decreasing function of this parameter.

R. and M., 1929: Two-dimensional Supersonic Aerofoil Theory. By M. J. Lighthill, B.A., of the Aerodynamics Division, N.P.L. 19 pp., 11 diag., January 21st, 1944. 3s. 6d. net.

The previous work on the theory of sharp-nosed aerofoils in a supersonic stream is collected and summarised, and a proof

is given of the behaviour of such a stream flowing past a smooth surface which authors from Ackeret (1925) onwards have assumed. Practical methods and tables are given which will help the forces on such an aerofoil to be calculated exactly, except in so far as the effects of viscosity are ignored. Their exact results are compared with certain convenient approximations.

R. and M. 1946: The Virtual Inertias of a Tapered Wing in Still Air. By W. Pritchard Jones, M.A., of the Aerodynamics Division, N.P.L. 5 pp., 2 diag., August 6th, 1941. 1s. 3d. net.

The inertial constants of a wing are usually determined by resonance experiments in still air. As the values obtained include the virtual inertia effect due to the external air, they should not be used to predict critical speeds for flutter in conjunction with theoretically deduced derivatives, such as those given in R. and M. 1942. The allowances for the virtual inertia effect can be estimated by the methods explained in this note.

Identical results are deduced by three methods which depend respectively on:

- (a) Vortex sheet theory.
- (b) Doublet distribution.
- (c) Potential flow.

R. and M. 1934: Note on R.A.E. Annular Airflow Orifice. By A. R. Howell, B.A. 4 pp., 2 diag., November, 1939. 1s. net.

Experience with the R.A.E. sink type air flowmeter has shown that it is very insensitive to changes in the conditions of entry and that it is not suitable for use in an aircraft or for measurement of flow in a horizontal pipe. This report gives details of experiments made to determine a better form of orifice and its behaviour under different entry conditions. The orifice has been tested under four different entry conditions, including a right-angled bend, and the discharge coefficient was found to be unaffected by these changes within the limits of experimental error ($\pm \frac{1}{2}$ per cent).

For an orifice designed in accordance with the information given, the discharge coefficient up to pressure ratios of 1.10 can be taken as 0.645, independent of entry conditions. For more accurate work the variation in the discharge coefficient due to the annulus width should be taken into account.

R. and M. 1939: Measurements of Rudder Hinge Moments on a Model of a Single-Engined Aircraft. By L. W. Bryant, B.Sc., A.R.C.S., A. S. Halliday, B.Sc., Ph.D., D.I.C., and C. H. Burge, of the Aerodynamics Division, N.P.L. 18 pp., 22 diag., July 14th, 1941. 3s. 6d. net.

A number of reports of "snaking" of the aircraft which forms the subject of this report have been made, and at least one serious accident which pointed to rudder fuselage flutter. A number of wind tunnel experiments have been carried out on models to determine rudder hinge moments with various modifications of the rudder in an attempt to explain full-scale experience. Snaking is not possible unless the rudder is very closely balanced (b_2 small) and unless b_1 is positive or, if negative, very small; the model experiments on hinge moments indicate very close balance for small displacements of the rudder, when the rudder is approximately along the relative wind, and also small positive values of b_1 under the same conditions; in fact, the conditions favouring snaking and flutter are clearly present. On the full scale it was found at first that 20in. of trailing-edge cords cured the snaking; but subsequently reports of variable behaviour of rudders all supposed to be standard with these cords were made. The model tests suggest that 20in. of cord is inadequate for a certain cure, but that 58in. should render the rudder safe.

Some experiments were made with airscrew running. There is little effect of rotation, but the value of $-b_2$ is increased by the increased speed of the slipstream. Changes in b_1 are erratic as might perhaps be expected in view of the variable conditions in the slipstream.

Some tests on the probable effect on the section of the rudder of the sagging of the fabric suggest that this effect is unimportant.

CIVIL AVIATION NEWS

TRAINING FOR FUTURE

ROUTINE passenger- and freight-carrying sides of air transport are covered in a three weeks' concentrated course at the R.A.F. "University of Air Transport" on the Wiltshire downs.

DAKOTAS WANTED

THE Railway Air Services are reported to be negotiating with the Ministry of Civil Aviation and U.S. authorities for the purchase of several Dakotas.

STOCKHOLM-OSLO

A SWEDISH-OPERATED air service from Stockholm to Oslo was scheduled to open last week.

Sweden already has a regular air service to and from Denmark and Britain and occasional trips to America and France are made by special courier aircraft.

HAWAII MARS

THE 72-ton Hawaii Mars (which has a wing span of 200ft.), the first of the 20 freight-carrying flying-boats destined for the Pacific front, made its first flight last week. The aircraft, which took off from the Martin Plant at Baltimore, has a top speed in excess of 225 m.p.h.

FOR BUENOS AIRES

THE new airport planned for Buenos Aires and to be located near Villa Ezciza, between the rivers Mantanzas and Las Artigas and Aguiere, will have six runways, of which only three are to be constructed at first.

These runways will be 2,743 yards long with provision for an extension up to 7,100 yards.

FROM AUSTRALIA

THE long-foreshadowed Bill to nationalise Australian inter-State airlines was introduced in the Canberra House of Representatives. The Bill provides for the establishment of an Australian Airline Commission of five appointed by the Governor-General and charged with the responsibility of providing safe and economically operated inter-State airlines. The commission's powers might be extended to cover international services. Provision is made for the initial appropriation of £3,000,000, and the commission would appoint the general manager and staff and would have power to acquire aircraft and other property, not including land. The Minister's approval would be necessary where the commission contracted for supplies from abroad in excess of £10,000 and before it purchased or sold assets over the value of £5,000 or lease hold for more than five years.

Under penalties provided in the Bill other services may not compete with the commission's airlines. Urging the approval of the measure, Mr. Drakeford, Minister for Air and Civil Aviation, said that the Commonwealth always had had power over inter-State air transport and that nationalisation would facilitate the co-ordination of civil operations and R.A.A.F. strategic requirements and encourage local manufacture of engines and aircraft.

A representative of the airline companies said in Melbourne recently that the Government's will to nationalise the inter-State airlines if passed would be challenged in the High Court and the legal fight carried, if necessary, to the Privy Council. A legal opinion has been taken on the matter.

SOVROM

A SOVIET-RUMANIAN Convention has been signed at the Ministry of Communications in Bucharest providing for the creation of a Soviet-Rumanian air transport company, "Sovrom Transport," with its head office at Bucharest.

STEPPING UP

MAIL service between the U.K. and Australia will now reach Sydney in 63 hours instead of 72 hours hitherto taken for the journey. Lancastrian aircraft with which the mail service will be operated will make two return trips weekly.

SPAIN-U.S.

THREE new landing strips two miles long and 55 yards wide to accommodate giant aircraft of the Super Fortress type are being constructed at the San Pablo airdrome outside Seville for a service between Spain and America which it is hoped will begin in October.

The service will begin with two and increase to ten aircraft daily. The first aircraft will run to North America and later services will extend to South America, principally the Argentine, carrying passengers, freight and mails.

U.S. PRIORITIES ASSISTANCE

AMERICAN aircraft manufacturers will be given priorities assistance in obtaining new materials, where surplus materials cannot be obtained or used, for the production of commercial transport-type aircraft for use by foreign flag air carriers, the U.S. War Production Board announced. This means that foreign flag airlines may now place purchase orders with U.S. manufacturers for transport-type aircraft upon obtaining export licences approved by the U.S. State Department, W.P.B. said.

Consideration of priorities assistance, however, will be given only when the proposed equipment is to be used for war-supporting, reconstruction, relief or rehabilitation activities.

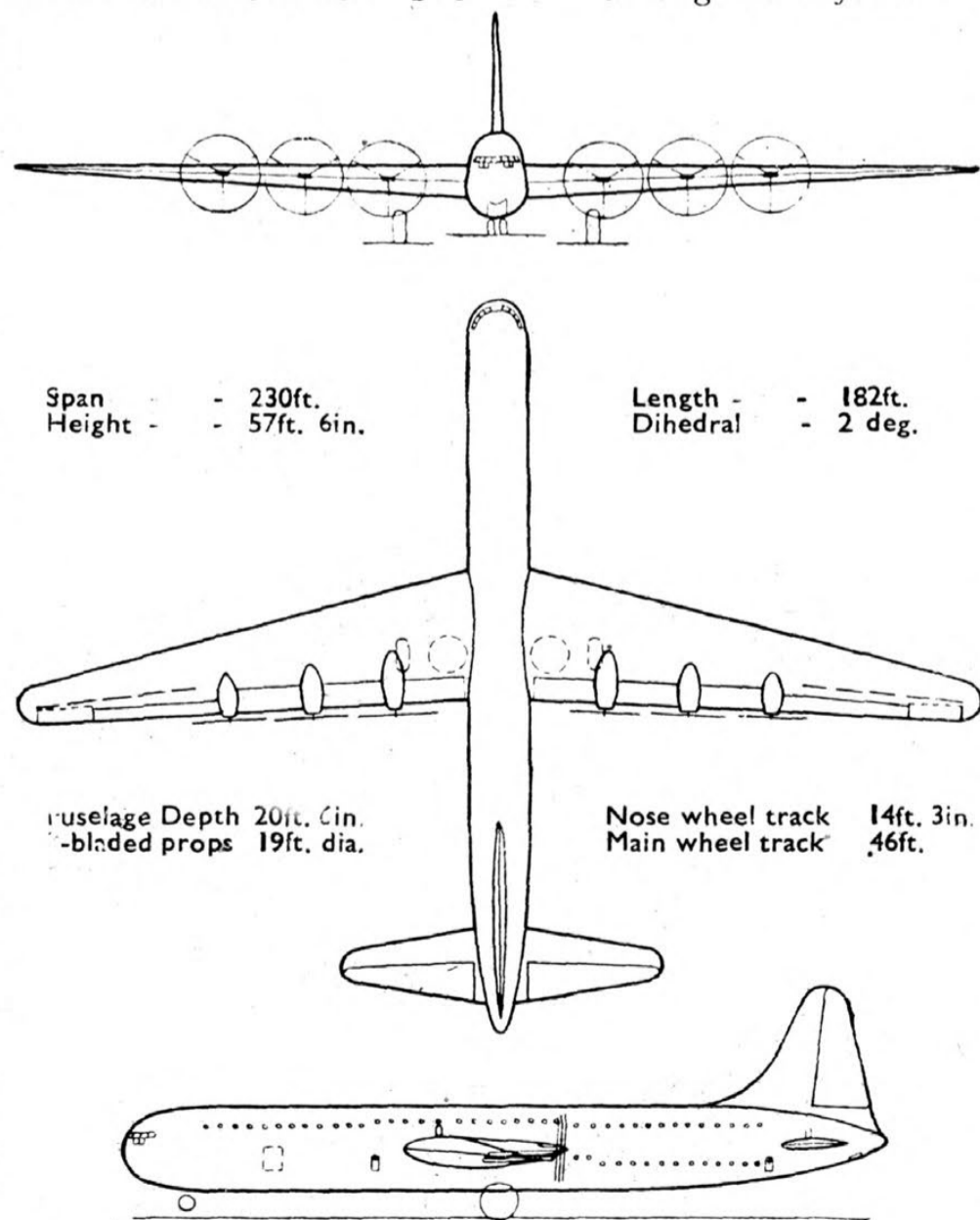
WHAT THEY WANT

A SURVEY made on the basis of questionnaires distributed among holiday makers in New England (U.S.) gave the following instructive results on preferences in air travel: On a long trip, approximately 3,000 miles, 56 per cent. preferred to travel by air, 33.5 per cent. by steamship and 8.5 per cent. by rail if fares were equal. If air fares were higher, the percentages differed only slightly. On type preferences, 66 per cent. voted lower speed at lower cost, the survey disclosed.

The survey concludes that to some extent popularity of air travel increases with distance and demonstrates it on the basis of answers polled: comparative popularity ratios steamship to aircraft were to all foreign areas 10:6, to Hawaii and Pacific Islands 10:9, to Australia 10:7, to South America 10:6, while the same ratio for travel to Europe, the U.K. and Russia was about 10:5.

On the question of preference between U.S. and foreign airlines—if accommodation and fares were equal—54.2 per cent. preferred U.S. airlines, 21.7 per cent. expressed no preference and 1.1 per cent. preferred foreign airlines.

It is pointed out that although the survey was limited to the north-east area of the U.S. its relative value is merited by the fact that this area generated approximately 75 per cent. of travellers to foreign ports.



Model 37: The 160-ton Convair Model 37 passenger liner is to carry a payload of 50,000 lb. over 4,200 miles cruising at 310 to 342 m.p.h. Fifteen of this type are reported to have been ordered by Pan American Airways.

CIVIL AVIATION NEWS

A NEW LINK

AN airline service is reported by Moscow Radio to be in operation between Berlin and Moscow.

AIR SAFETY

AIR CHIEF MARSHAL SIR FREDERICK BOWHILL, the United Kingdom delegate to the Interim Council of the Provisional International Civil Aviation Organisation in Montreal, said that the Council's meeting on August 15th will cover the whole field of aviation.

Every possible means of providing safety on international air routes will be examined, Sir Frederick added.

AIRPORT FOR BUTE

EVIDENCE of the keen interest of civic bodies in the provision of air transport facilities comes from all parts of the country. Most recent is the claim of Provost Mackay, of Rothsay, asking that priority should be given for the provision of an airport in the Island of Bute.

EIRE NOT INVITED

EIRE received no invitation to attend the recent Commonwealth Air Transport Conference and was not going to seek any, stated Mr. De Valera in the Dublin Dail.

"While I say that," Mr. De Valera added, "I should also like to say that there is a war situation for Britain and the States of the British Commonwealth, and if they are discussing there matters which relate to their conduct of war, I quite understand why we should not receive any such invitation."

AMERICAN PLANS

MR. JOHN E. Slater, chairman of American Export Airlines arrived recently in Europe to discuss the company's new routes and schedules.

It will be recalled that by the recent decision of the C.A.B. American Export Airlines were authorised to operate air services from New York, Boston, Philadelphia, Washington, Chicago and Detroit to the British Isles and to the European Continent via two routes. One via Newfoundland, the Azores, Foynes, Glasgow; London, Amsterdam, Copenhagen, Berlin and Warsaw, to Moscow; the other route via Labrador, Greenland, Iceland, Stavanger, Stockholm, Helsinki and Leningrad to Moscow.

At the same time, American Export Airlines and American Airlines (a U.S. domestic airline) were permitted to provide jointly a single system of air transport service, the first instant of a unified domestic and overseas airline system.

ANGLO-EGYPTIAN

FOLLOWING lengthy negotiations in Cairo between the British and Egyptian Governments and British Airways and Misr Airlines, agreement is understood to have been reached for the formation of a company to be known as Egyptian Airways, with an initial capital of £250,000, to operate air services between Britain and Egypt. The project now awaits the formal sanction of the Council of Ministers.

The company will have four Egyptian directors, one the chairman, and three British, and its aircraft will fly under the Egyptian flag. The service will be subsidised, with the British subsidy larger than that from Egypt.

It will be some time before the company begins operating, owing to the difficulty of obtaining aircraft.

Negotiations for the creation of an Anglo-Egyptian air company were started in 1938, but were halted by the outbreak of war. They were resumed with the Nashed Pasha Government when the end of the war in Europe approached, but were delayed by the fall of the Government.

The Misr Airlines is an Egyptian company with several years' successful experience in operating local airlines. It has services operating to Jerusalem, Beirut and Damascus, and it is expected that its aircraft will connect with main airlines from Britain.

It will be recalled that the Egyptian application to the Chicago Conference included, in addition to services to neighbouring countries, following routes: to Istanbul from Cairo via Beirut, Adana and Ankara; to London via Athens, Rome and Paris and from Mersa Matruh via Crete and Athens to Istanbul.

In view of the plans entertained by different Middle East countries to establish their own air transport services it can be assumed that some reciprocity arrangements will have to be made between the Egyptian and the Palestine, Lebanon, Syrian and other Governments.

CANADA-FRANCE

FORERUNNER of a fleet of passenger and cargo transports to be delivered to France for internal air lines, a Dakota aircraft left Montreal for Paris on the first flight ever to be made from Canada to France.

The aircraft will be used until France can produce her own post-war type of commercial machines.

PORTUGUESE DEVELOPMENT

THREE two-engined Dragon Rapides (D.H.89s) ordered from England are to make their first trial flights on the Lisbon-Oporto route in October.

The development of Portuguese International Airlines is to be entrusted to a new organisation to be known as the Aerial Transport Company. Senhor Carlos Beck, the well-known Portuguese airman, will be its technical director.

New airfields are to be constructed in Luanda, Angola, and on the Ilha do Sal in Cape Verde Island—Portugal's "Devil's Island," it was officially announced.

SURPLUS

THE fourteenth allocation of surplus transport aircraft, non-standard to military specifications, was announced recently by the Surplus Property Board. The transports allocated at this time include five of the Douglas DC-3 type and two of the Lockheed Lodestar type. Three of the DC-3 type aircraft allocated had been rejected by airlines to which they have previously been assigned. The other two were recently declared surplus.

Up to date, 163 Douglas DC-3 type transports have been allocated. Domestic airlines have received 103 and foreign airlines 60.

Previously, the Board removed Lockheed Lodestars from allocation because the supply had become sufficient to satisfy the demand. In the announcement the Board said that the airline version of the Lockheed Lodestar (C-60) was again subject to allocation because the supply was not sufficient to meet the demand from those entitled to priority consideration under the terms of the Surplus Property Act. Under the new procedure two airline-type Lockheed Lodestars were allocated.

VETERANS

CATALINA flying-boats which, as previously reported, have been withdrawn from the service operated by Qantas Empire Airways from Perth to Ceylon and Karachi across the Indian Ocean, have rendered yeoman wartime service.

Commencing operations in July, 1943, the Catalina flying-boats forged the first regular air link between Australia and the outside world, after the Empire flying-boat route between England and Australia was severed by the fall of Singapore in 1942.

At that time the Catalina flying-boat was the only aircraft available which had sufficient range to cover, non-stop, the distance of over 3,500 miles between Perth and Ceylon. Although the greater part of the route was through Japanese patrolled territory, the service encountered the enemy on one occasion only. Both aircraft and crew escaped unhurt.

The first "Qantas"-operated service departed eastbound from Ceylon on July 10th, 1943, in the command of Captain R. B. Tapp, and the first westbound service from Western Australia to Ceylon on July 22nd, 1943, also in the command of Captain Tapp.

From the outset a weekly frequency was maintained until the acquisition of additional aircraft enabled frequency to be increased and allowed the service to be extended to Karachi. The average time taken for the Perth-Ceylon section of the trip was 27 hours. Astronomical navigation of an exceptionally high standard was required to make a landfall after traversing 3,500 miles of the Indian Ocean.

Towards the end of 1944 two converted Liberator bombers were received from the British Air Ministry. After being further modified for civil use in the company's workshops at Brisbane, they joined the Catalina fleet and increased the mail and priority passenger uplift considerably.

For the two years from July, 1943, to the end of June, 1945, the Catalinas carried 13,953lb. of freight and 110,002lb. of mail across the Indian Ocean. A total of 630 passengers were carried on 262 crossings, which constituted a distance of 924,860 statute miles flown.

Now, after two years of continuous service, the sturdy Catalinas are to retire, leaving this important Empire air route to be operated by larger and faster Liberator and Lancaster aircraft.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

ATLANTIC COMPETITION

B.O.A.C.'s Initial Advantage

IS it strictly fair to suggest that B.O.A.C. cannot stand against three competitors? If the three U.S. airlines do not work in close harmony they will be wasting their energy fighting each other. B.O.A.C. starts with the advantage of unified operational direction and ground facilities. Given a good team of personnel, there is no reason why B.O.A.C. should not hold its own and gain great respect for this country. Give it a chance to prove its ability under peacetime conditions before you condemn it. Your remarks are almost unpatriotic and savour of influence from the profit-seeking financiers of private industry. We have chosen, through Parliament, to have B.O.A.C. to run our airlines. Let us back it up and give it all the best facilities and advertisement abroad that we can. Go to it, *Flight!*

F. G.

[We are not in the least concerned with guarding the interests of "profit-seeking financiers of private industry." They are well able to do that themselves. What we do want is that British air lines should be operated in the most efficient manner, and we do not believe that any single company, no matter how well run, can hope to cope with competition from abroad if its energies are divided over routes spread all over the world. We have never believed in monopolies, and we fail to see why it should be "unpatriotic" to go on saying so after a monopoly has been foisted on the country.—ED.]

ATLANTIC AIR TRAVEL

The Influence of Currency Regulation

FROM across the Atlantic we often hear staggering estimates of post-war air travel. Calculations worked out, votes collected and super-optimistic prospects are made of the colossal, phenomenal, terrific increase in the passenger traffic. While all this may be simply the result of a tendency to overstatement, two important factors ought to be considered in gauging post-war air travel. First passenger travel is largely the result of economic activities, and it is open to doubt whether in rehabilitating Europe this will provide a substantial flow of passenger traffic across the Atlantic. Secondly, willingness to use air transport and reasonable fares are in themselves no guarantee for a substantial increase in traffic volume. No matter how much a European or an Australian may want to visit the States, if in the interest of his national economy he were able to take with him only 10 or 20 pounds sterling, he would have to restrain his desires. So long as most countries in the world remain short of dollar currency the traffic across the Atlantic may, in the best case, be a one-way-business.

In the post-war world it will largely depend on the currency regulations adopted in different countries to what extent people will be able to avail themselves of the air transport activities offered. Since such a policy is the result of political and trade regulations, the potential increase in air travel will be largely conditioned by the economic co-operation between nations.

"ZETETIC."

BRITISH AND BEST

But We Need Far Better Publicity

FURTHER to Mr. R. E. Gregory's letter in the July 19th issue of *Flight*, may I join him in expressing my congratulations to you on the wonderful job *Flight* has done and is doing in telling the world of this country's achievements in aviation?

I wholeheartedly agree with Mr. Gregory's observations regarding the various British aircraft he lists, although I feel that he does somewhat less than justice to the Short Shetland in comparing it to the Mars. It must be remembered that the Shetland programme was tossed from Ministerial pillar to Ministerial post as an unwanted encumbrance when the aircraft could have been in production a clear two years ago.

As for the Blackburn project of the Clydesman, as I see the position, almost no individual firm, from its own resources alone, can afford to undertake the development of such a huge aircraft as a private venture. Where these mammoth aircraft are concerned it is essential that some form of official guarantee

be given the manufacturers so that they will not plunge their all into a venture which is doomed to receive no support.

Quite obviously there is no reason at all why any experienced concern (like Blackburn's) should not evolve a design (such as the Clydesman) and sincerely feel that it is capable of a full future; after all, no profit-making firm is going to waste its time with something in which it has little faith. But beyond that point it is a vastly different matter—to get the paper work into concrete fact is a very large step and, in most cases, requires official help.

Whether or not the powers-that-be are sufficiently well aware of their influence on the future course of Britain's aviation is a moot point; it is to be hoped that they are. Nevertheless, the manufacturers themselves have a liability other than their products, and it consists of furthering the most powerful sales campaign throughout the world in an endeavour to bring to the notice of the potential buyers that this country's aircraft are second to none.

In the past the industrial concerns of Britain have been almost childlike in their outlook on publicity, and it is true to say that in most cases their whole reaction to publicity is bound up solely in advertising—and not very good advertising at that. Shrewd, carefully calculated publicity (used in its widest sense) is capable of wielding a great and potent force for good on behalf of the British aviation industry; but it is up to the industry itself to generate that force, not as rabble attacks on the subject, but as a great concerted effort.

I look forward to the day when this simple lesson is learned and put into effect.

CLAUDE ALDBURY.

FLYING BOATS ON OCEAN ROUTES

Too Many Lives Lost in Recent Landplane Accidents

YOUR announcement in *Flight* of July 26th that the Air Ministry had abandoned the search for the Liberator missing since it left Montreal on July 3rd with Government officials returning from the San Francisco Conference, once again raises the question of using flying boats for trans-oceanic routes.

It will scarcely be denied that there have been too many of these disappearances, and a very considerable number of people who could ill be spared have lost their lives in this way, among them Commander Brabner shortly after his appointment to the post of Parliamentary Under-Secretary for Air.

Advocates of landplanes for all routes are fond of arguing that if a forced alighting in the open sea has to be made, it matters little whether the aircraft is a seaplane or a landplane, since it will sink very quickly in any case. In the old days, when it was a case of searching mainly with surface vessels, that may have been true, but surely the fact that searches can now be made with aircraft, and are so made on a very large scale, aided by all modern radio equipment, has put a very different complexion on the problem. There are a great many days of the year on which a flying-boat pilot could manage to alight safely on the sea, even if he could not get off again. And, having alighted, the flying boat would probably survive for several hours at least before breaking up. During that time wireless signals could be sent out giving the location of the machine. A landplane, once awash, if it does not sink immediately, would rarely be in a condition to send out such signals.

What is the reason usually advanced for using landplanes? The only one I can call to mind is that they are more economic to operate than flying boats. But even placing the problem on that low level, is the argument necessarily sound? I think that if one looks far enough it may be that there is little, if anything, to choose between the two classes.

Fuel is admitted to be one of the heaviest cost items in the balance sheet. Now the price of fuel is largely governed by the locality at which it is to be delivered. It will be very different in the Gulf of Mexico and in the centre of Africa. Surely the flying boat will score heavily by being able to pick up its fuel at points where transport costs are lowest, viz., on the seaboard of the world? I feel that this fact alone might, on many routes at any rate, actually make the flying boat more economical in operation than the landplane.

It would be interesting if we might have this subject thoroughly ventilated in the columns of *Flight*, either by articles or correspondence or both.

"SHELLBACK."



IN THE CHARLOTTENBURGER CHAUSSEE : Men of the Royal Air Force Regiment marching past Mr. Winston Churchill, who took the salute at the British victory parade in Berlin.



SERVICE AVIATION



Royal Air Force and Naval Air Arm News and Announcements

Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations:—

Third Bar to Distinguished Service Order

Act. Air Vice-Marshal B. E. EMBRY, C.B., D.S.O., D.F.C., A.F.C., A.O.C. 2 Group.—In 1940, Air Vice-Marshal Embry was a prisoner of war in Germany. After his escape 70,000 reichmarks were offered for his capture but, in spite of this, he has, since D-Day, flown on many operational sorties. He has flown as an ordinary pilot of the force on many long and hazardous flights, often in adverse weather, setting throughout an example of skill and courage that has inspired the squadrons in his group and has materially contributed to the high standard of operational efficiency they have attained.

Bar to Distinguished Service Order

Act. Wing Cdr. D. W. DONALDSON, D.S.O., D.F.C., R.A.F.V.R., No. 192 Sqn.—This officer has almost completed his third tour of operational duties. Since being posted to his present squadron he has taken part in many outstanding missions and has invariably set a splendid example of courage and skill to the crews under his command. In addition, Wing Cdr. Donaldson has been personally responsible for the planning of all the sorties completed by his unit. Much of the success achieved can be attributed to his fearlessness and coolness in the face of danger.

Group Capt. B. A. EATON, D.S.O., D.F.C., R.A.A.F.—Group Capt. Eaton assumed command of his Wing in August, 1944, and since that date his career has been marked with the same outstanding success as when he was a squadron commander. He always leads any particular hazardous operation himself, and it is largely owing to his devotion to duty and skill that these operations have been completely successful. Despite fierce anti-aircraft fire from the enemy's defences this officer has only lost one member of the many formations he has led. This is entirely owing to his meticulous attention to detail and intensive



Air Marshal Sir Leonard H. Slatter, K.B.E., C.B., D.S.C., D.F.C., who is now A.O.C.-in-C. Coastal Command. Previous to his new appointment Sir Leonard commanded No. 15 Group in Coastal Command.

study of all target information prior to the attack. In December, 1944, Group Capt. Eaton led a formation of four squadrons of aircraft in an attack on the Bjelovar Barracks, Yugoslavia. Very adverse weather was encountered and it was necessary to circle the target area for 1½ hours before a pin point could be made. The attack was then made at a low level in the face of intense anti-aircraft fire and excellent results obtained. Other successful sorties by the officer include the destruction of the Arsa Power House and the Iolanda ammunition dump. He has also led formations of aircraft which have damaged eight enemy aircraft on the ground and destroyed numerous mechanical transport vehicles, tanks, bridges and locomotives.

Act. Wing Cdr. C. G. MILSON, D.S.O., D.F.C., R.A.A.F., No. 455 (R.A.A.F.) Sqn.—Since being awarded the D.S.O. this officer has participated in many sorties, including numerous attacks on enemy shipping. In February, 1945, Wing Cdr. Milson led a large formation of aircraft in an attack against a strong enemy naval force in the Ford fjord, Norway. The vessels were at anchor close in to shore. High mountains rise in close proximity to these narrow waters. Nevertheless, Wing Cdr. Milson, employing good tactics, led his formation into the attack with great determination. Enemy fighter opposition and considerable anti-aircraft opposition were encountered, but the attack was well pressed home. In this brilliantly executed operation, Wing Cdr. Milson showed skill, courage and devotion to duty of a high order.

Act. Wing Cdr. L. B. ERCOLANI, D.S.O., R.A.F.V.R., No. 99 Sqn.—This officer is now on his third tour of operational duty and has served in both the European and Far Eastern theatres of war. He has led his squadron on numerous daylight bombing attacks against a wide variety of targets, and on many low level sorties against road and rail bridges. Wing Cdr. Ercolani has invariably displayed exceptional courage, tenacity and skill. Under his inspiring leadership, his unit has attained a high standard of operational efficiency and achieved many outstanding successes.

Distinguished Service Order

Wing Cdr. L. FOX, D.F.C., R.A.F., No. 203 Sqn.—Since being awarded the D.F.C., Wing Cdr. Fox

SERVICE AVIATION

has participated in a large number of operational missions. He has consistently shown a high degree of skill and courage, qualities which have been reflected in the fighting spirit of the squadron he commands. In March, 1945, Wing Cdr. Fox led the squadron in an attack against enemy shipping. A cargo vessel and a second ship were hit by bombs and several smaller vessels were effectively machine-gunned. In April, 1945, this officer led his formation in an attack against two enemy vessels, one of them being heavily armed. Despite much opposing fire the attack was pressed home to a successful conclusion. Wing Cdr. Fox's skilful leadership contributed materially to the success achieved.

Act. Wing Cdr. J. L. BERLANDINA, D.F.C., R.A.F.O.—Since being awarded a bar to the D.F.C., Wing Cdr. Berlandina has participated in many sorties. Throughout these operations he has continued to display the highest qualities of skill and courage and has set a fine example to all. Towards the end of the fighting in the Italian theatre, Wing Cdr. Berlandina led formations of aircraft in attacks against various targets with great success. On one occasion the target was the pontoon bridge at Polesella. The objective was attacked with great determination and resulted in the destruction of the approaches to the bridge and to transport of certain ferry terminals nearby. Two days later this officer led an attack on Po river crossings in the Polesella-Guarda Veneta area. By his skilful leadership and exceptional determination, he played a good part in the successes obtained. He has set a magnificent example to all.

Major D. LIDDELL, D.F.C., S.A.A.F., No. 24 (S.A.A.F.) Sqn.—Throughout a large number of operational sorties, this officer has displayed outstanding courage, skill and devotion to duty. On one occasion he led a successful attack against Kastelli Pediada airfield in Crete. Shortly after leaving the target the formation was attacked by a number of Messerschmitt 109s, which broke through the outnumbered fighter escort. Major Liddell's cool and skilful leadership was such that, although some of our aircraft were damaged, none was lost, and his gunner was able to destroy one of the enemy fighters. This is only one incident in many, during which, under this officer's brilliant leadership, his squadron has been enabled to render outstanding service both in the Middle East and Italian theatres of war.

Act. Sqn. Ldr. W. T. KLERSY, D.F.C., R.C.A.F., No. 401 (R.C.A.F.) Sqn.—Throughout two tours of operational duty, Sqn. Ldr. Klersy has displayed outstanding leadership, courage and devotion to duty. Since the award of a Bar to the D.F.C. he has destroyed or damaged a further 90 enemy vehicles, 8 locomotives and 8 goods trucks. He has also destroyed three more enemy aircraft, bringing his total to at least 10 enemy aircraft destroyed. This officer has moulded his squadron into a powerful operational unit that, by maintaining a consistently high standard in every phase of ground or air activity, has set a magnificent example to the rest of the Wing.

Major T. R. J. TAYLOR, D.F.C., S.A.A.F., No. 93 Sqn.—This officer has completed many sorties on his third tour of operational duty. On three occasions he led the squadron in harassing attacks

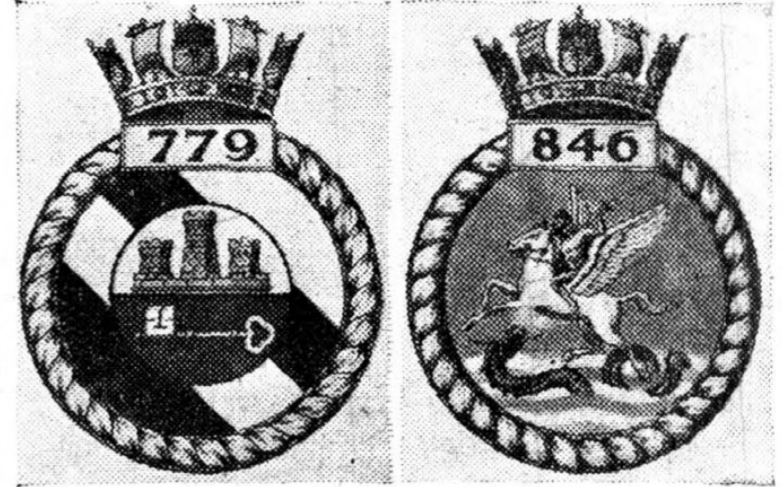
on a variety of the targets in the battle area. In these well planned and resolutely executed sorties much damage was inflicted on the enemy. The results obtained reflect the greatest credit on the gallant efforts of Major Taylor, whose skill and leadership were of a high order. Since the commencement of the final offensive in the Italian theatre in April, 1945, the squadron commanded by Major Taylor was responsible for the destruction of a large number of mechanical vehicles, numerous barges and tanks. Many buildings occupied by the enemy, a good number of gun positions and various road and rail bridges were most effectively attacked. This officer set an example which has inspired all.

Wing Cdr. E. P. W. HUTTON, D.F.C., A.F.C., R.A.F.—Wing Cdr. Hutton has completed a very large number of sorties involving many attacks on enemy shipping. He has consistently displayed outstanding devotion to duty and throughout has shown courage and enthusiasm of a high standard. His efficiency was amply demonstrated in May, 1945, when he led a successful low level attack against enemy shipping in the Baltic, much damage being inflicted on the enemy. Wing Cdr. Hutton has set a fine example of keenness, determination and gallantry.

Sqn. Ldr. A. G. DECK, D.F.C., R.A.F.V.R., No. 143 Sqn.—Sqn. Ldr. Deck has completed a large number of sorties, including many attacks on enemy shipping. He is a highly skilled and courageous pilot and has set a fine example in pressing home his attacks. His excellent work has contributed materially to the successes obtained. On three occasions in the early part of May, 1945, Sqn. Ldr. Deck participated in sorties against various types of enemy ships. One of the targets was a heavily armed enemy vessel. This officer led his formation in to the attack with great skill. Many hits with rocket projectiles and cannon fire were obtained and the vessel's guns were effectively silenced. He later attacked and set on fire a vessel of the coastal type. This officer has invariably displayed the highest standard of devotion to duty.

Act. Sqn. Ldr. P. S. BLOMFIELD, D.F.C., R.A.F., No. 260 Sqn.—Sqn. Ldr. Blomfield is a highly skilled and efficient pilot. He has completed a very large number of sorties against a variety of targets, and his ability, coupled with great enthusiasm, has contributed materially to the successes obtained. During the Italian campaign this officer led his squadron in attacks against gun positions, armoured vehicles and enemy occupied headquarters with a high degree of success. Much damage was inflicted on the enemy. Sqn. Ldr. Blomfield is a fine leader whose example has been well reflected in the operational efficiency of his squadron.

Act. Wing Cdr. J. N. STACEY, D.F.C., R.A.F.O., No. 160 Sqn.—These members of aircraft crew have taken part in many operational missions. One night they were detailed to participate in a mine-laying mission in enemy waters. The operation called for a high degree of courage and resolution, and the success achieved reflects the credit on their efforts. On reaching base at the completion of the sortie they had been in the air for some 21 hours on a flight covering more than 3,000 miles.



(Left) Badge of No. 779 Squadron, Naval Air Arm. "Finis Coronat Opus" (The end crowns the work). On a field bendy of gold and black, a roundel per fesse white and green. In chief the battlements of a tower issuant proper. In base a key fesse-wise, wards upwards gold. (Right) Badge of No. 846 Squadron, Naval Air Arm. "Semper Instans." (Always ready). On a blue field, out of water barry wavy in base white and blue, a man proper, helmeted red, holding in his sinister hand a sword, gold, and riding on a Pegasus, white, attacking a sea serpent proper.

Sqn. Ldr. C. D. HARRIS-ST. JOHN, D.F.C., R.A.F.V.R., No. 4 Sqn.—Sqn. Ldr. Harris-St. John has completed a long series of difficult operational missions with conspicuous success, throughout which he has consistently displayed courage, skill and devotion to duty of a high order. In December, 1944, he planned and led a photographic operation which involved flying straight and level for five miles over one of the most heavily defended areas of Holland. The photographs obtained were excellent, and produced information of the utmost value to the army. Under this officer's brilliant and inspiring leadership, his squadron has produced results which have been of vital importance to the 1st Canadian Army, and without which the last great battles and the subsequent rapid advance could scarcely have been planned.

Act. Sqn. Ldr. G. A. BUTLER, D.F.C., R.A.F.V.R., No. 11 Sqn.—Sqn. Ldr. Butler has a long record of operational flying, and is now on his third tour of duty. He has, throughout, displayed a fine fighting spirit and outstanding courage and devotion to duty. Under his brilliant leadership the squadron has flown on many long distance sorties, penetrating deeply into enemy territory. These missions have been completed without fighter cover in aircraft which are virtually defenceless against Japanese fighters, and, during the period of this officer's command, no pilot has been lost through enemy action. In addition, Sqn. Ldr. Butler has participated in numerous operations in close support of the 14th Army with excellent results.

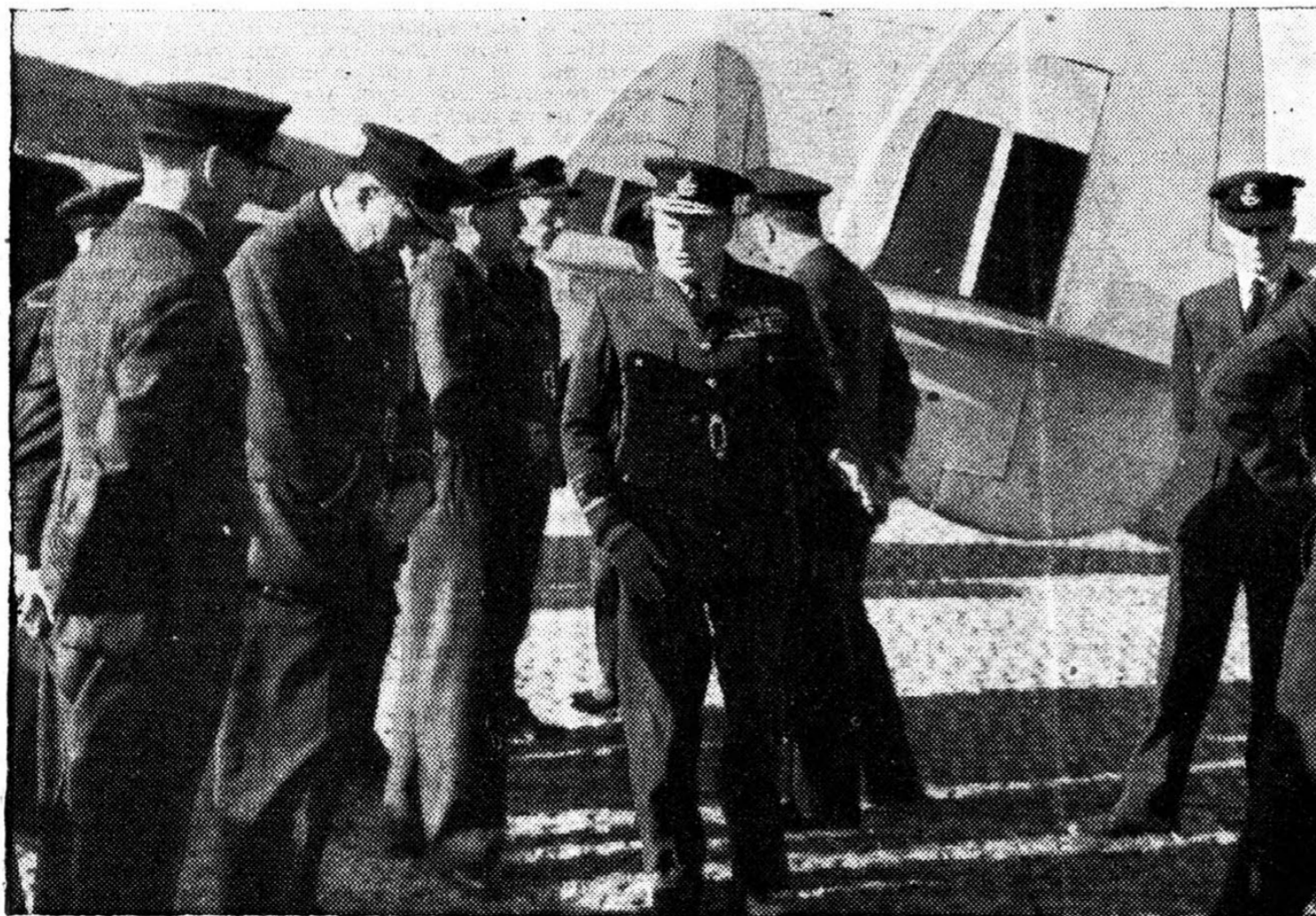
Act. Wing Cdr. R. G. KNOTT, D.F.C., R.A.F.O., No. 524 Sqn.—This officer has commanded the squadron with outstanding success for many months. During the period he has participated in numerous attacks on enemy shipping. In these operations he has displayed the highest standard of skill, courage and leadership, qualities which have contributed in good measure to the successes obtained. His devotion to duty over a long period of operational flying has been unflinching.

Second Bar to Distinguished Flying Cross

Flt. Lt. K. R. TRIGGS, D.F.C., R.A.F.V.R., No. 692 Sqn.
Sqn. Ldr. D. C. FAIRBANKS, D.F.C., R.C.A.F., No. 274 Sqn.
Flt. Lt. K. F. THIELE, D.S.O., D.F.C., R.N.Z.A.F., No. 3 Sqn.

Bar to Distinguished Flying Cross

Flt. Lt. G. R. I. PARKER, D.F.C., D.S.M., R.A.F., No. 219 Sqn.
Flt. Lt. A. J. HISCOCK, D.F.C., R.A.F.V.R., No. 156 Sqn.
Flt. Lt. T. J. LONG, D.F.C., R.A.F.V.R., No. 608 Sqn.
Flt. Lt. K. H. NEVILLE, D.F.C., R.A.F.V.R., No. 109 Sqn.
Flt. Lt. W. G. O'TOOLE, D.F.C., R.A.F.V.R., No. 78 Sqn.
Act. Sqn. Ldr. K. A. MATHESON, D.F.C., R.C.A.F., No. 83 Sqn.
Flt. Lt. M. J. BELANGER, D.F.C., R.C.A.F., No. 425 (R.C.A.F.) Sqn.
Flt. Lt. D. A. MACFADYEN, D.F.C., R.C.A.F., No. 406 (R.C.A.F.) Sqn.
F/O. R. W. TAYLOR, D.F.C., R.C.A.F., No. 161 Sqn.
Sqn. Ldr. D. C. GORDON, R.C.A.F., No. 402 (R.C.A.F.) Sqn.
Sqn. Ldr. H. E. WALMSLEY, D.F.C., R.A.F.V.R., No. 350 Sqn.
Sqn. Ldr. P. A. WOMERSLEY, D.F.C., A.A.F., No. 18 Sqn.



THE NEW CHIEF: Air Chief Marshal Sir Sholto Douglas, K.C.B., M.C., D.F.C., arriving at Buckeburg airfield to take up his post as A.O.C.-in-C. British Air Forces of Occupation.

- Flt. Lt. D. I. HALL, D.F.C., R.C.A.F., No. 414 Sqn.
 Flt. Lt. G. F. BRANTINGHAM, D.F.C., R.A.F.V.R., No. 159 Sqn.
 Capt. P. McCLURE, D.F.C., S.A.A.F., No. 40 (S.A.A.F.) Sqn.
 Lt. Col. J. M. FAURE, D.S.O., D.F.C., S.A.A.F.
 Flt. Lt. T. H. E. GOLDIE, D.F.C., R.A.F.V.R., No. 86 Sqn.
 Flt. Lt. C. G. THOMPSON, D.F.C., R.A.A.F., No. 455 (R.A.A.F.) Sqn.
 P/O. J. D. S. GARRATT, D.F.C., R.A.F.V.R., No. 109 Sqn.
 Act. Flt. Lt. G. E. WILSON, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 F/O. M. A. HAMPE, D.F.C., R.C.A.F., No. 35 Sqn.
 Flt. Lt. D. T. N. SMITH, D.F.C., R.A.F.V.R., No. 692 Sqn.
 Flt. Lt. R. G. SNELLING, D.F.C., R.A.F.V.R., No. 162 Sqn.
 Flt. Lt. J. S. WALKER, D.F.C., R.A.F.V.R., No. 128 Sqn.
 Flt. Lt. R. L. WOOLDRIDGE, D.F.C., R.A.F.V.R., No. 161 Sqn.
 Act. Flt. Lt. C. BRAMELD, D.F.C., R.A.F.V.R., No. 109 Sqn.
 Act. Flt. Lt. J. R. DAVIS, D.F.C., R.A.F.V.R., No. 109 Sqn.
 Act. Flt. Lt. M. J. FINLAY, D.F.C., R.A.F.V.R., No. 582 Sqn.
 Act. Flt. Lt. A. H. GIBSON, D.F.C., R.A.F.V.R., No. 83 Sqn.
 Act. Flt. Lt. W. A. CHARLEY, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 Act. Flt. Lt. J. F. CORRIGAN, D.F.C., R.C.A.F., No. 7 Sqn.
 Flt. Lt. T. ELLISON, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 Act. Flt. Lt. J. G. FULTZ, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 Act. Flt. Lt. W. A. S. McCONNEL, D.F.C., No. 405 (R.C.A.F.) Sqn.
 Act. Flt. Lt. J. W. McDONALD, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 Act. Flt. Lt. D. A. McNAUGHTON, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 Act. Flt. Lt. H. R. WHITTALL, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 Act. Flt. Lt. A. D. N. KANARENS, D.F.C., R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.
 F/O. E. C. GREGORY, D.F.C., R.A.F.V.R., No. 35 Sqn.
 F/O. L. C. HOWELL, D.F.C., R.A.F.V.R., No. 163 Sqn.
 F/O. R. G. LEEVERS, D.F.C., R.A.F.V.R., No. 166 Sqn.
 F/O. K. W. MORGAN, D.F.C., R.A.F.V.R., No. 7 Sqn.
 F/O. A. R. MORRIS, D.F.C., R.A.F.V.R., No. 608 Sqn.
 F/O. K. J. SHEPPARDSON, D.F.C., R.A.F.V.R., No. 608 Sqn.
 F/O. B. J. SHERRY, D.F.C., R.A.F.V.R., No. 608 Sqn.

Distinguished Flying Cross

- Act. Flt. Lt. D. R. WARE, R.A.F.V.R., No. 635 Sqn.
 Act. Flt. Lt. K. H. WARD, R.A.F.V.R., No. 195 Sqn.
 Act. Flt. Lt. F. J. WILLGESS, R.A.F., No. 427 (R.C.A.F.) Sqn.
 Act. Flt. Lt. I. D. YOUNG, R.A.F.V.R., No. 635 Sqn.
 F/O. A. ARTHURSON, R.A.F.V.R., No. 102 Sqn.
 F/O. J. A. BARSON, R.A.F., No. 608 Sqn.
 F/O. C. E. BAUD, R.A.F.V.R., No. 195 Sqn.
 F/O. H. E. BISHOP, R.A.F.V.R., No. 192 Sqn.
 F/O. W. A. BLAND, R.A.F.V.R., No. 227 Sqn.
 F/O. H. BREEZE, R.A.F.V.R., No. 35 Sqn.
 F/O. C. H. BROWN, R.A.F.V.R., No. 635 Sqn.
 F/O. J. BUCKLEY, R.A.F.V.R., No. 431 (R.C.A.F.) Sqn.
 F/O. R. BUNTING, R.A.F.V.R., No. 195 Sqn.
 F/O. T. N. BUTCHER, R.A.F.V.R., No. 128 Sqn.
 F/O. P. J. R. CARTWRIGHT, R.A.F.V.R., No. 103 Sqn.
 F/O. J. COCKS, R.A.F.V.R., No. 102 Sqn.



FAMOUS No. 2 GROUP'S GROUP : (Left to Right) : Air Comdre. D. F. W. Atcherley, D.S.O., D.F.C., Senior Air Staff Officer; Group Capt. P. G. Wykeham-Barnes, D.S.O., D.F.C.; Wing Cdr. H. P. Shallard and Air Vice-Marshal B. E. Embry, C.B., D.S.O., A.F.C., A.O.C. No. 2 Group.

- F/O. S. K. COLEMAN, R.A.F.V.R., No. 76 Sqn.
 F/O. O. C. CRONSHAW, R.A.F.V.R., No. 102 Sqn.
 F/O. H. W. G. CROOKS, R.A.F., No. 625 Sqn.
 F/O. T. G. CULVERHOUSE, R.A.F.V.R., No. 115 Sqn.
 F/O. W. P. F. DANIELS, R.A.F.V.R., No. 150 Sqn.
 F/O. A. P. DERRINGTON, R.A.F.V.R., No. 466 (R.A.A.F.) Sqn.
 F/O. A. G. DICKINSON, R.A.F.V.R., No. 195 Sqn.
 Act. Flt. Lt. J. HARRIS, R.A.F.V.R., No. 550 Sqn.
 Act. Flt. Lt. R. M. HASTIE, R.A.F.V.R., No. 223 Sqn.
 Act. Flt. Lt. R. K. HAWKINS, R.A.F.V.R., No. 635 Sqn.
 Act. Flt. Lt. C. A. HAYLEY, R.A.F.V.R., No. 170 Sqn.
 Act. Flt. Lt. B. J. HAYNES, R.A.F.V.R., No. 214 Sqn.
 Act. Flt. Lt. W. O. HEFFERNAN, R.A.F., No. 462 Sqn.
 Act. Flt. Lt. J. R. HOAR, R.A.F.V.R., No. 10 Sqn.
 Act. Flt. Lt. C. HOLMES, R.A.F.V.R., No. 7 Sqn.
 Act. Flt. Lt. E. A. JACKSON, R.A.F., No. 100 Sqn.
 Act. Flt. Lt. W. J. JACOBS, R.A.F.V.R., No. 195 Sqn.
 Act. Flt. Lt. B. A. JARVIS, R.A.F.V.R., No. 109 Sqn.
 Act. Flt. Lt. N. T. KEEN, R.A.F., No. 199 Sqn.
 Flt. Lt. P. KINGSFORD-SMITH, R.A.A.F., No. 138 Sqn.
 F/O. D. R. DOSSETOR, R.A.A.F., No. 194 Sqn.
 P/O. L. G. GOSPER, R.A.A.F., No. 7 Sqn.
 Flt. Lt. W. R. BENNETT, R.A.A.F., No. 453 (R.A.A.F.) Sqn.
 Flt. Lt. E. H. GIERSCH, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
 Act. Flt. Lt. J. F. BOLAND, R.A.A.F., No. 61 Sqn.
 Act. Flt. Lt. S. M. GRANT, R.A.A.F., No. 115 Sqn.
 Act. Flt. Lt. K. J. SULLIVAN, R.A.A.F., No. 90 Sqn.
 F/O. D. L. EVANS, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
 F/O. E. J. HOLDEN, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
 F/O. R. C. C. HOUGHTON, R.A.A.F., No. 102 Sqn.
 F/O. L. G. KEAYS, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
 F/O. E. J. MALMGREN, R.A.A.F., No. 76 Sqn.
 F/O. J. J. McDADE, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
 F/O. D. J. MCKAY, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
 F/O. K. F. MILLS, R.A.A.F., No. 576 Sqn.
 F/O. K. C. MORIESON, R.A.A.F., No. 617 Sqn.
 F/O. B. E. WARD-SMITH, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
 Act. F/O. E. A. CUNLIFFE, R.A.A.F., No. 102 Sqn.
 Act. F/O. R. D. JENNINGS, R.A.A.F., No. 15 Sqn.
 Act. F/O. J. E. SMART, R.A.A.F., No. 12 Sqn.
 Act. F/O. A. O. SELLWOOD, R.A.A.F., No. 15 Sqn.
 P/O. A. W. CALLUM, R.A.A.F., No. 158 Sqn.
 P/O. D. M. CRUDEN, R.A.A.F., No. 582 Sqn.
 P/O. E. O. DENNETT, R.A.A.F., No. 7 Sqn.
 P/O. A. V. GOODACRE, R.A.A.F., No. 582 Sqn.
 P/O. R. B. IRVINE, R.A.A.F., No. 101 Sqn.
 P/O. R. L. JACOBS, R.A.A.F., No. 156 Sqn.
 P/O. F. W. L. MANN, R.A.A.F., No. 150 Sqn.
 P/O. G. MCKEAN, R.A.A.F., No. 101 Sqn.
 P/O. W. J. WALKER, R.A.A.F., No. 626 Sqn.
 W/O. J. R. JONES, R.A.A.F., No. 156 Sqn.
 W/O. K. K. KEMP, R.A.A.F., No. 77 Sqn.
 W/O. F. J. MCFARLANE, R.A.A.F., No. 218 Sqn.

- Act. Sqn. Ldr. N. R. SMITH, R.A.A.F., No. 455 (R.A.A.F.) Sqn.
 F/O. R. W. SANDERSON, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
 Act. F/O. F. STEPHENS, R.A.A.F., No. 514 Sqn.
 P/O. L. J. MANNING, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
 F/O. R. E. KENNEDY, R.N.Z.A.F., No. 158 Sqn.
 F/O. J. S. MARRIS, R.N.Z.A.F., No. 50 Sqn.
 Act. Sqn. Ldr. J. R. RODGERS, D.F.M., R.N.Z.A.F., No. 75 (N.Z.) Sqn.
 Flt. Lt. W. J. WAKELIN, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
 Act. Flt. Lt. R. C. CORDON, D.F.M., R.N.Z.A.F., No. 625 Sqn.
 Act. Flt. Lt. K. W. R. McMILLAN, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
 Flt. Lt. J. DAVIDSON, R.N.Z.A.F., No. 194 Sqn.
 Flt. Lt. B. D. NEW, R.N.Z.A.F., No. 177 Sqn.
 F/O. K. H. BLINCOE, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
 P/O. J. McCULLOUGH, R.N.Z.A.F., No. 75 (R.N.Z.A.F.) Sqn.
 F/O. M. KRAKOVSKY, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
 F/O. F. J. KUMSKY, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
 F/O. L. E. LARSON, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 F/O. R. F. LAWRENCE, R.C.A.F., No. 7 Sqn.
 F/O. J. H. LECKENBY, R.C.A.F., No. 128 Sqn.
 F/O. G. H. LOWRY, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
 F/O. J. P. LYNN, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
 F/O. J. H. MACFADDEN, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
 F/O. W. W. MACKERACHER, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
 F/O. D. T. MACNEIL, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
 F/O. A. A. MCKENZIE, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 F/O. E. H. MCKEOWN, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
 F/O. C. I. MCKINSTRY, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
 F/O. M. L. MELLSTROM, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 F/O. R. A. MILLS, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
 F/O. H. C. MOONEY, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 F/O. J. F. MORTON, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
 F/O. J. A. M. NASH, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
 F/O. E. B. PEACOCK, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
 F/O. C. F. PHRIPP, R.C.A.F., No. 576 Sqn.
 F/O. A. L. POTTER, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
 F/O. D. A. ROMBOUGH, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
 F/O. C. J. ROWE, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 F/O. H. A. SHENKER, R.C.A.F., No. 550 (R.C.A.F.) Sqn.
 F/O. R. E. STEER, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 F/O. D. J. STEWART, R.C.A.F., No. 415 (R.C.A.F.) Sqn.
 F/O. J. S. TONGE, R.C.A.F., No. 434 (R.C.A.F.) Sqn.



(Left) Badge of No. 878 Squadron, Naval Air Arm. "Feles non pusilla" (A cat, but no weakling). On a black field, a wildcat's face, white. (Right) Badge of No. 784 Squadron, Naval Air Arm. "Illumina tenebras" (Lighten our Darkness). On a black field a bat, gold, breathing flames proper in chief; and issuant from water barry wavy in base proper, a torch gold inflamed, also proper.

SERVICE AVIATION

F/O R. J. THOMPSON R.C.A.F., No. 433 (R.C.A.F.) Sqn.
 F/O L. J. TROMAN, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
 F/O G. B. ULLETT, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
 F/O H. W. WALKER, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
 F/O J. V. WATSON, R.C.A.F., No. 635 Sqn.
 F/O J. A. WELCH, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 F/O H. F. WILLIAMSON, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
 F/O M. D. WOODS, R.C.A.F., No. 166 Sqn.
 F/O L. W. WRIGHT, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
 Act. F/O A. J. MARTEL, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
 Act. F/O L. F. MCGUIRE, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
 P/O J. P. R. C. BENOIT, R.C.A.F., No. 433 (R.C.A.F.) Sqn.
 P/O I. D. BENTON, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 P/O H. G. BISHOP, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
 P/O J. W. CLIFTON, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
 P/O G. A. COX, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 P/O A. H. DELORIE, R.C.A.F., No. 158 (R.C.A.F.) Sqn.
 P/O M. E. FRASER, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
 P/O W. H. HARTMAN, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
 P/O W. T. JENSEN, R.C.A.F., No. 433 (R.C.A.F.) Sqn.
 P/O K. N. MACLEAN, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
 P/O E. P. J. MAHONY, R.C.A.F., No. 415 (R.C.A.F.) Sqn.
 P/O A. G. MAXHAM, R.C.A.F., No. 415 (R.C.A.F.) Sqn.
 P/O L. H. McDONALD, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
 P/O G. D. PARRY, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
 P/O B. RAKUS, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
 P/O C. J. A. RAMSEY, R.C.A.F., No. 35 Sqn.
 P/O H. W. ROGERS, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
 P/O G. A. ROUTLEDGE, R.C.A.F., No. 158 Sqn.
 P/O S. D. SMITH, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 P/O E. T. TAYLOR, R.C.A.F., No. 7 Sqn.
 P/O J. A. TURPIN, R.C.A.F., No. 102 Sqn.
 P/O L. J. WESTON, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
 W/O.2 W. E. ALLAN, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 W/O.1 G. E. DESCHAIINE, R.C.A.F., No. 74 (N.Z.) Sqn.
 W/O.1 V. H. HORNER, R.C.A.F., No. 35 Sqn.
 W/O. R. F. MCKENZIE, R.C.A.F., No. 7 Sqn.
 W/O.2 P. C. ROACH, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 W/O.2 A. J. WILLIAMS, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
 F/O K. DUNLOP, R.N.Z.A.F., No. 15 Sqn.
 F/O R. M. DWERRYHOUSE, R.N.Z.A.F., No. 128 Sqn.
 F/O D. D. JONES, R.N.Z.A.F., No. 162 Sqn.
 Act. Sqn. Ldr. D. GALLANDERS, D.F.M., R.A.F., No. 128 Sqn.

Act. Sqn. Ldr. M. G. HARRIS, D.F.M., R.A.F.V.R., No. 139 Sqn.
 Flt. Lt. J. ARCHER, A.F.C., R.A.F., No. 578 Sqn.
 Flt. Lt. T. R. CARPENTER, R.A.F.V.R., No. 169 Sqn.
 Flt. Lt. E. W. CURTIS, R.A.F.V.R., No. 12 Sqn.
 Flt. Lt. J. MARPOLE, R.A.F.V.R., No. 15 Sqn.
 Act. Flt. Lt. R. ARNETT, D.F.M., R.A.F.V.R., No. 139 Sqn.
 Act. Flt. Lt. P. R. C. BRYANT, R.A.F.V.R., No. 158 Sqn.
 Act. Lt. F. A. BUDDEN, R.A.F.V.R., No. 102 Sqn.
 Act. Flt. Lt. J. L. COX, R.A.F.V.R., No. 622 Sqn.
 Act. Flt. Lt. C. R. CUTHILL, R.A.F., No. 149 Sqn.
 Act. Flt. Lt. W. HUTCHINSON, R.A.F.V.R., No. 170 Sqn.

Distinguished Flying Medal

Act. Flt. Sgt. (later P/O.) A. A. JOHNSON R.N.Z.A.F., No. 97 Sqn.
 Flt. Sgt. A. L. HUMPHRIES (now P/O) R.N.Z.A.F., No. 75 (N.Z.) Sqn.
 Flt. Sgt. R. D. MACKINNON, R.A.F.V.R., No. 85 Sqn.
 Flt. Sgt. J. MCGARRY, R.A.F.V.R., No. 160 Sqn. (For citation see Act. Wing Cdr. J. N. STACEY, D.S.O., D.F.C.)
 Flt. Sgt. J. R. MANN, R.A.F.V.R., and Flt. Sgt. F. G. REYNOLDS, R.A.F.V.R., both of No. 156 Sqn. (For citation see Sgt. D. R. BOWERS, C.G.M.)
 Flt. Sgt. (now P/O.) A. ALLAN, R.A.F.V.R., No. 153 Sqn.
 Flt. Sgt. G. ANSBRO, R.A.F.V.R., No. 138 Sqn.
 Flt. Sgt. F. J. APPLEBY, R.A.F.V.R., No. 149 Sqn.
 Flt. Sgt. P. R. ASLIN, R.A.F.V.R., No. 9 Sqn.
 Flt. Sgt. J. N. BAGGS, R.A.F., No. 51 Sqn.
 Flt. Sgt. R. W. BAIRD, R.A.F.V.R., No. 9 Sqn.
 Flt. Sgt. G. R. BRADBURY, R.A.F.V.R., No. 617 Sqn.
 Flt. Sgt. D. BROWN, R.A.F.V.R., No. 7 Sqn.
 Sgt. (later P/O.) A. GILLESPIE, R.A.F.V.R., No. 61 Sqn. (since deceased).
 Sgt. N. LAW, R.A.F.V.R., No. 115 Sqn. (since deceased).
 Sgt. W. A. TIMMS, R.A.F.V.R., No. 115 Sqn. (since deceased).
 Sgt. W. WRIGHT, R.A.F.V.R., No. 215 Sqn.
 Flt. Sgt. V. W. BROWN, R.A.F.V.R., No. 15 Sqn.
 Flt. Sgt. V. D. BURRELL, R.A.F.V.R., No. 156 Sqn.
 Flt. Sgt. P. D. CARPENTER, R.A.F.V.R., No. 103 Sqn.
 Flt. Sgt. H. CARTER, R.A.F.V.R., No. 7 Sqn.
 Flt. Sgt. R. H. CATLIN, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.
 Flt. Sgt. J. A. DADGE, R.A.F., No. 617 Sqn.
 Flt. Sgt. K. A. EXELBY, R.A.F.V.R., No. 223 Sqn.
 Flt. Sgt. (now P/O.) F. F. FISH, R.A.F.V.R., No. 153 Sqn.
 Flt. Sgt. J. D. GOWER, R.A.F., No. 582 Sqn.
 Flt. Sgt. H. K. GRAY, R.A.F.V.R., No. 149 Sqn.
 Flt. Sgt. W. C. GREEN, R.A.F.V.R., No. 466 (R.A.A.F.) Sqn.
 Flt. Sgt. M. M. GREENBLATT, R.A.F.V.R., No. 10 Sqn.
 Flt. Sgt. K. GUNTHORPE, R.A.F.V.R., No. 582 Sqn.
 Flt. Sgt. (now P/O.) I. G. HENDERSON, R.A.F.V.R., No. 153 Sqn.
 Flt. Sgt. L. J. HINCHLY, R.A.F.V.R., No. 7 Sqn.
 Flt. Sgt. A. W. HODKINSON, R.A.F., No. 10 Sqn.
 Flt. Sgt. G. HOPKINS, R.A.F.V.R., No. 626 Sqn.
 Flt. Sgt. C. HOULGRAVE, R.A.F.V.R., No. 15 Sqn.
 Flt. Sgt. R. J. HOWARD, R.A.F.V.R., No. 142 Sqn.
 Flt. Sgt. (now P/O.) W. W. INGHAM, R.A.F.V.R., No. 7 Sqn.
 Flt. Sgt. P. F. JACKSON, R.A.F.V.R., No. 9 Sqn.
 Flt. Sgt. K. W. KEMP, R.A.F.V.R., No. 578 Sqn.
 Flt. Sgt. (now P/O.) A. F. LACEY, R.A.F.V.R., No. 156 Sqn.
 Flt. Sgt. E. W. BANKS, No. 156 Sqn. (since deceased).

Flt. Sgt. S. H. BUBB, A.A.F., No. 356 Sqn.
 Flt. Sgt. A. COX, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn. (since deceased).
 Flt. Sgt. S. GRUNDY, R.A.F., No. 101 Sqn. (since deceased).
 Flt. Sgt. J. HULBERT, R.A.F.V.R., No. 159 Sqn.
 Act. Flt. Sgt. T. J. PRITCHARD, R.A.F.V.R., No. 156 Sqn. (since deceased).
 Flt. Sgt. H. G. LEE, R.A.F.V.R., No. 156 Sqn.
 Flt. Sgt. (now P/O.) H. R. LYNHAM, R.A.F.V.R., No. 9 Sqn.
 Flt. Sgt. I. D. MACGREGOR, R.A.F.V.R., No. 153 Sqn.
 Flt. Sgt. (now P/O.) F. MIDDLETON, R.A.F.V.R., No. 578 Sqn.
 Flt. Sgt. T. MILLIN, R.A.F.V.R., No. 578 Sqn.

Official Corrections

Casualty Communiqué No. 527.

Delete all prisoners of war.
 Under MISSING, delete Sgt. J. E. Bennett, Sgt. J. E. Bozeat, F/O F. J. Carlton, F/O F. J. Watson, and transfer to KILLED IN ACTION. Delete Sgt. T. E. Buckley, F/O P. Donnelly, Flt. Sgt. R. B. Goldsmith, F/O A. Harman, Flt. Lt. A. D. Pelly, Sgt. J. D. Routledge.
 Under KILLED ON ACTIVE SERVICE, Sgt. J. V. Robinson should read Flt. Sgt.
 Under R.A.A.F., MISSING, delete W/O W. G. Pearce.
 Under R.C.A.F., MISSING, W/O D. J. Campbell should read P/O. Flt. Sgt. G. S. Guthrie should read P/O. Delete F/O A. J. Macleod. Flt. Sgt. K. A. Miller should read P/O. Delete F/O K. W. Rainford and transfer to KILLED IN ACTION.
 Under KILLED ON ACTIVE SERVICE, P/O G. J. Guay should read F/O.
 Under S.A.A.F., MISSING, delete Lt. R. H. R. Flack and insert under heading KILLED IN ACTION.

Casualty Communiqué No. 528.

Under PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION, Sgt. P. K. Heller should read P/O.
 Under MISSING, BELIEVED KILLED IN ACTION, delete W/O W. H. Hollis.
 Under MISSING, delete Sgt. D. W. S. Amps, Sgt. W. Brewer, Flt. Lt. F. W. Cooper, F/O J. D. Craven, F/O T. Dykens, Flt. Sgt. B. Jackson, Flt. Sgt. D. E. Johnson, Flt. Sgt. W. S. Jones, F/O D. W. King, Sgt. P. Looms, F/O D. P. F. McCaig, Sgt. W. K. McCallum, F/O S. A. Pearce, Sgt. S. G. Rother, Flt. Lt. L. H. Scargill, F/O W. K. Watson.
 Under Royal Australian Air Force, MISSING, delete W/O H. W. Calman, Flt. Sgt. J. J. B. Grady, Flt. Sgt. P. W. C. Hutton, Flt. Sgt. T. P. Ledwith, P/O G. B. Swift, F/O R. E. Taylor, F/O D. D. Tennent, F/O J. H. Willmott.
 Casualty Communiqué No. 529.
 Under MISSING, delete Sgt. E. E. Barnes, W/O J. H. M. Bird, Sgt. P. Brooks, Flt. Sgt. C. B. Carter, Flt. Sgt. J. Connell, F/O J. A. Costello, P/O J. Crane, Flt. Lt. J. H. Dean, F/O T. W. Downey, Sgt. I. Graham, P/O F. E. Grimdsdale, Flt. Sgt. J. F. Le Marquand, F/O J. A. Lewis, F/O R. Mallinson, F/O P. W. Morgans, Flt. Lt. G. O. Powell, Sgt. K. Pratt, Sgt. E. C. Roberts, P/O J. E. F. Sadler, Sgt. W. A. Senior, Sgt. E. Stansill, Sgt. G. B. Tate, Flt. Sgt. E. Thompson, Flt. Sgt. J. C. E. Toit, Sqn. Ldr. T. J. Warner, F/O K. L. Worden.
 Under R.C.A.F., KILLED IN ACTION, Flt. Sgt. W. R. Southcott should read P/O.
 Under MISSING, delete F/O A. J. Breault and F/O G. B. Henson. F/O G. E. Creswell and W/O R. S. Pyatt transfer to KILLED IN ACTION. Flt. Sgt. A. J. Hunter should read P/O.
 Under R.N.Z.A.F., delete heading MISSING and F/O R. C. Noice.



THIS IS THE END : One of the Japanese "Baka" suicide bombs which was captured intact by the Americans. Presumably this capture has saved one Japanese life.